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The Feasibility of Establishing a Centralized Slaughterhouse on Kauai

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ABSTRACT

The level of beef and hog slaughter on Kauai has changed little over the past 20 years. From 1963 through 1972, practically all the hogs produced on the Island were killed there, but about 40 percent of all the cattle raised were shipped live to Honolulu. At the same time, much of the beef and pork consumed on Kauai was imported. If the beef and pork formerly imported could be produced and slaughtered on Kauai, and if the cattle formerly exported live could be slaughtered on Kauai and exported as beef, the volume of slaughter on the Island could be greatly increased.

Although little growth is expected in Kauai's hog production, both demand and supply conditions for beef now favor a substantial expansion of the Island's beef cattle industry. Demand for Choice or better grade beef has increased both on Kauai and in Honolulu. Favorable new supply factors are higher beef prices, additional land for pasture, and a new development of feed grain production. To translate potential into actual expansion will require the willingness to change and to cooperate at all levels of the Kauai cattle industry and of the Island community.

Four beef and two hog slaughterhouses are presently in operation on Kauai. All are approved by the State Meat Inspection Service. More animals could be killed in these slaughterhouses if they were operated for longer hours. The slaughter crew might be unable or unwilling to work longer hours, however, because slaughtering is primarily a second job for these men. Moreover, a greater volume of slaughtering would require more cold storage capacity than is currently available.

A future centralized slaughterhouse is assumed to be able to handle 50 cattle and 20 hogs per day, the number reasonably expected to be produced on Kauai in the near future. Costs of building and equipping such a slaughterhouse were estimated at about $400,000 more or less, depending on the level of its utilization. Since the slaughter volume of the slaughterhouse cannot now be predicted, four different assumptions were made regarding the volume of cattle and hogs that would be slaughtered annually. Slaughter Level 1: if 1250 cattle and no hogs were butchered--that is, about 40 percent of the average annual cattle slaughter on Kauai in the 1963-72 period--the slaughterhouse would lose $15,000 per year, or 4 percent of the invested capital. Even if 1500 hogs were slaughtered in addition to the 1250 cattle, the operation would still lose money. Slaughter Level 2: if 2500 cattle and 1500 hogs were butchered annually--amounting to about 80 and 50 percent, respectively, of the average annual cattle and hog kill during the 1963-72 decade--an estimated net profit of $36,000, or a 9 percent return on the invested capital, could be expected. Slaughter Level 3: if roughly the total number of cattle and hogs marketed on Kauai in an average year during 1963-72 were slaughtered, net returns would triple to $110,000, or 27 percent of the invested capital. Slaughter Level 4: if plant slaughter were expanded to twice the present cattle marketings and to 10 percent above present hog marketings on Kauai, the annual net profit would rise to $245,000, which would exceed the total original investment in the slaughterhouse in less than 2 years.

The establishment of a centralized slaughterhouse would encourage the expansion of the livestock industries on Kauai and be a factor in improving the quality of their products. Before such a centralized slaughterhouse could become a reality, however, the livestock producers of Kauai need to sign enough marketing agreements with a proposed slaughterhouse company to assure it of a sufficient slaughter volume and thus to make the slaughterhouse a viable proposition.

CONTENTS

Tables

Page

Figures

The Feasibility of Establishing a Centralized Slaughterhouse on Kauai

P.F. Philipp, J.C. Nolan, W.I. Hugh,
H.M. Gitlin, and M.A. Chaudhary

PREFACE

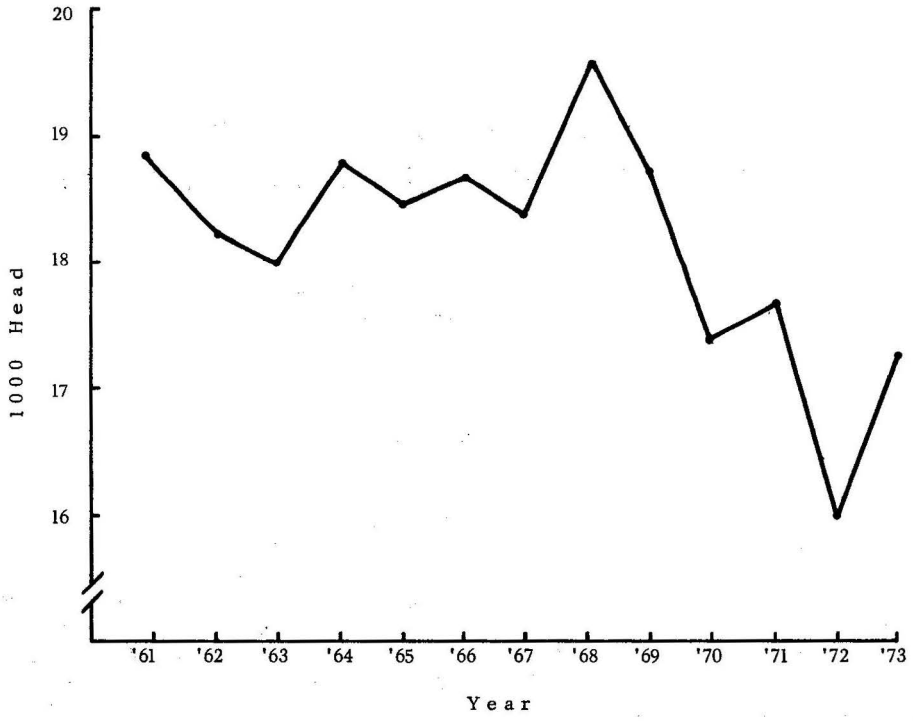
In its Senate Resolution No. 68, the Senate of the Seventh Legislature, 1973, State of Hawaii, requested the Department of Agriculture, State of Hawaii, to conduct a feasibility study on the establishment of a meat packing plant on Kauai (see Appendix A for Senate Resolution No. 68). The Department of Agriculture, in turn, asked the College of Tropical Agriculture of the University of Hawaii to undertake this study. The Kauai Task Force approved the conduct of the study with Kauai Task Force funds. A memorandum of agreement, which established the conditions for a feasibility study of a slaughterhouse and/or meat packing plant on the Island of Kauai, was signed between the Department of Planning and Economic Development of the State of Hawaii on behalf of the Kauai Task Force and the University of Hawaii for the College of Tropical Agriculture. This is the final report presenting the findings of the feasibility study.

We gratefully acknowledge the many people in agriculture, business, and government who gave generously of their time and provided information. Without their help this study could not have been made.

INTRODUCTION

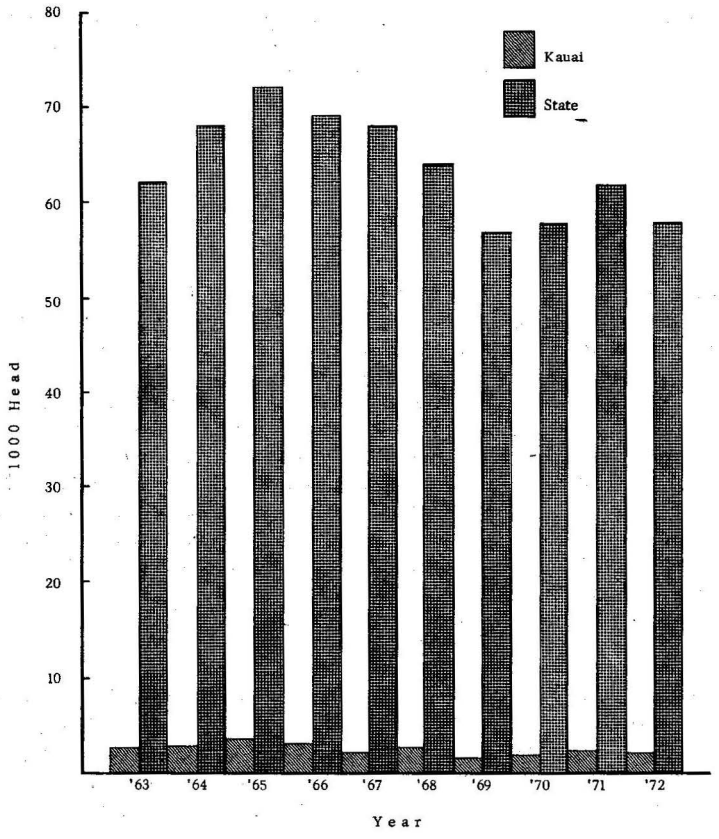
A "slaughterhouse" can be defined as a plant used to kill and dress animals to produce a wholesome carcass for retail distribution, possibly also with facilities for reducing the carcass to primal and retail cuts and to grind hamburgers; a "meat packing plant" can be defined as a plant used to slaughter animals, to produce sausages and cured meats, and to process inedible portions of the animal into fertilizer or animal feed. Based on these definitions, our conclusion was that a feasibility study of a centralized slaughterhouse for cattle and hogs was needed rather than of a meat packing plant, primarily because a meat packing plant would require a larger market outlet than just the Island of Kauai. A meat packing plant, moreover, would have to compete with the existing processing plants on the other islands of the State, particularly on Oahu. Thus, it was felt that Kauai has no comparative advantages to justify the establishment of an additional full-scale meat packing plant at this time.

This study deals, therefore, only with the feasibility of a centralized slaughterhouse on Kauai. In estimating the cost of building a slaughterhouse, however, we allowed sufficient space for simple meat processing, such as fabricating of primal or retail cuts, boning, and grinding. Furthermore, in estimating equipment costs of the plant, we included a small amount for processing equipment.



Source: Appendix, Tables B1 and B2

Figure 1. Number of cattle and calves on Kauai, 1961-73.



Source: Appendix, Table B11

Figure 2. Number of hogs on Kauai and State farms, 1963-72.

Opinions by knowledgable people in the Kauai livestock and slaughter industry in favor of a centralized slaughterhouse were that it would:

1. Encourage greater development of livestock industries on Kauai;
2. Provide more jobs;
3. Reduce slaughter costs;
4. Bring more uniform handling of carcasses;
5. Provide better meat cooling and storage facilities;
6. Encourage drylot feeding or other fattening operations on Kauai;
7. Bring federal beef carcass grading to Kauai;
8. Give buyers a better selection of the type and quality of carcass;
9. Result in more efficient use of government inspection personnel; and
10. Result in more efficient slaughtering and distribution of red meat carcasses.

Arguments heard against a centralized slaughterhouse were that it would:

1. Increase slaughter costs;
2. Increase transportation costs to and from the slaughterhouse;
3. Deprive those now employed in slaughtering of their jobs;
4. Disturb the present satisfactory relations between livestock producers, slaughterhouse operators, and retail outlets; and
5. Change the present way of life and work of livestock producers.

These arguments and comments will be considered in the study.

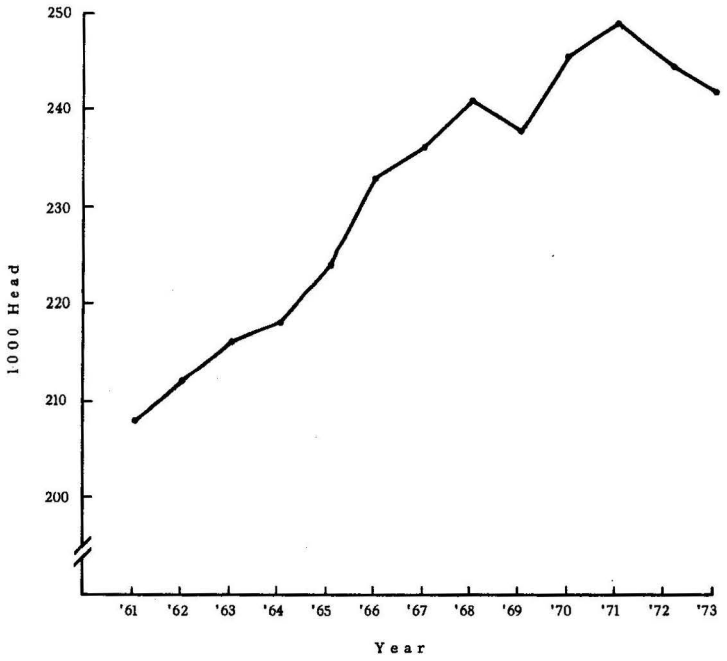
In this study, first an analysis is made of recent trends in the demand and supply of slaughter cattle, hogs, beef, and pork on Kauai. This is followed by a discussion of current production, slaughter, and marketing conditions for these products and the potential for expanding the cattle and hog industries on the Island. Based on the above analysis, several different assumptions are made regarding the potential volume of slaughter animals to support a centralized slaughterhouse on Kauai. The cost of establishing the slaughterhouse and the profitability of operating at these several slaughter levels are estimated. The study ends with a discussion of the results and conclusions.

RECENT TRENDS IN DEMAND FOR AND SUPPLY OF MEAT ANIMALS AND MEAT

A review of recent trends in the number, amount, and supply of and demand for cattle, beef, hogs, and pork on Kauai is necessary to determine whether additional or revised slaughter facilities are needed on the Island. A detailed study of these trends is presented in Appendix B; here we will summarize Appendix B and show how these trends affect the feasibility of a centralized slaughterhouse.

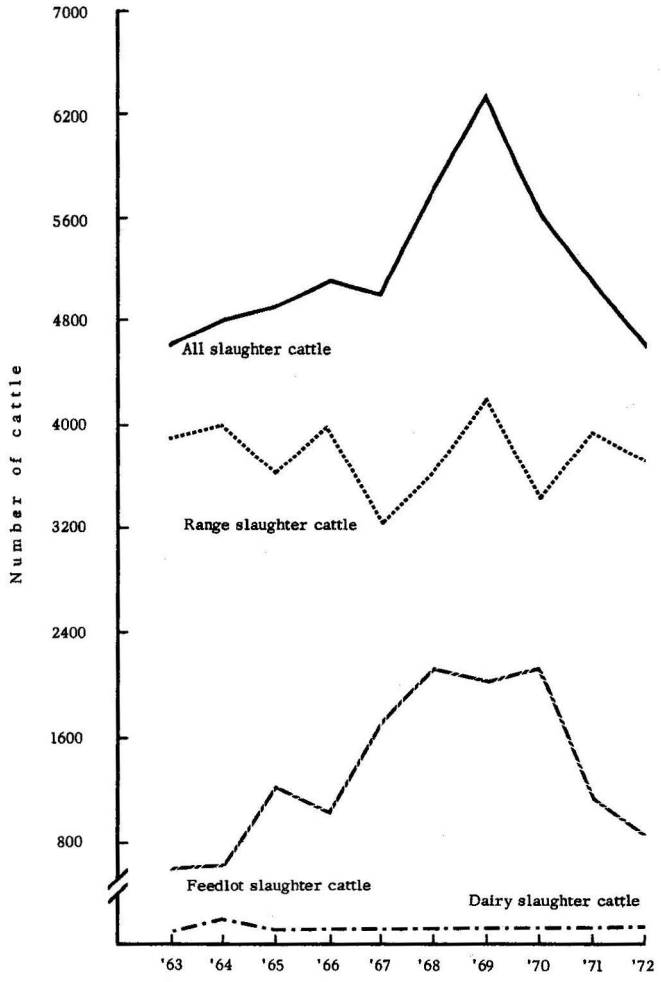
Cattle and Hog Numbers

The number of both cattle and hogs on Kauai declined between the early 1960s and 1972. On January 1, 1961, for instance, there were 18,800 cattle and calves on the Island; on January 1, 1973, there were 17,300 (see Figure 1). Thus, cattle decreased by 8 percent during this period. Dairy cows declined most, by 50 percent, from 800 to only 400; beef cattle numbers, however, decreased too, by 6 percent, from 17,600 to 16,600 (see Tables B1 and B2, Appendix B). The number of hogs on Kauai declined by 35 percent between December 1, 1965, when a high point of 3400 head was reached, and December 1, 1972, when 2200 head of all ages were left on the Island (see Figure 2).



Source: Appendix, Tables B3 and B4

Figure 3. Number of all cattle and calves in State of Hawaii, 1961-73.



Source: Appendix, Table B5

Figure 4. Number of slaughter cattle sold which originated on Kauai, 1963-72.

The cattle and hog industries on Kauai seem to have been less vigorous than in the State as a whole during the same 10-year period. While cattle numbers decreased on Kauai by 7 percent between the periods 1965 and 1973, they increased by 15 percent in the State (see Figures 1 and 3). Similarly, while hog numbers declined by 35 percent on Kauai between 1965 and 1972, the decrease was only 19 percent for the State (see Figure 2).

Despite this somewhat uninspiring picture so far, Kauai's cattle and hog industries showed production potentials above the output realized in 1972, the last year for which complete statistics on livestock numbers were available. Cattle numbers in January 1968 were 13 percent above those in January 1973, and hog numbers in December 1965 were 55 percent above those in December 1972 (see Figures 1 and 2).

Slaughter Cattle Sold

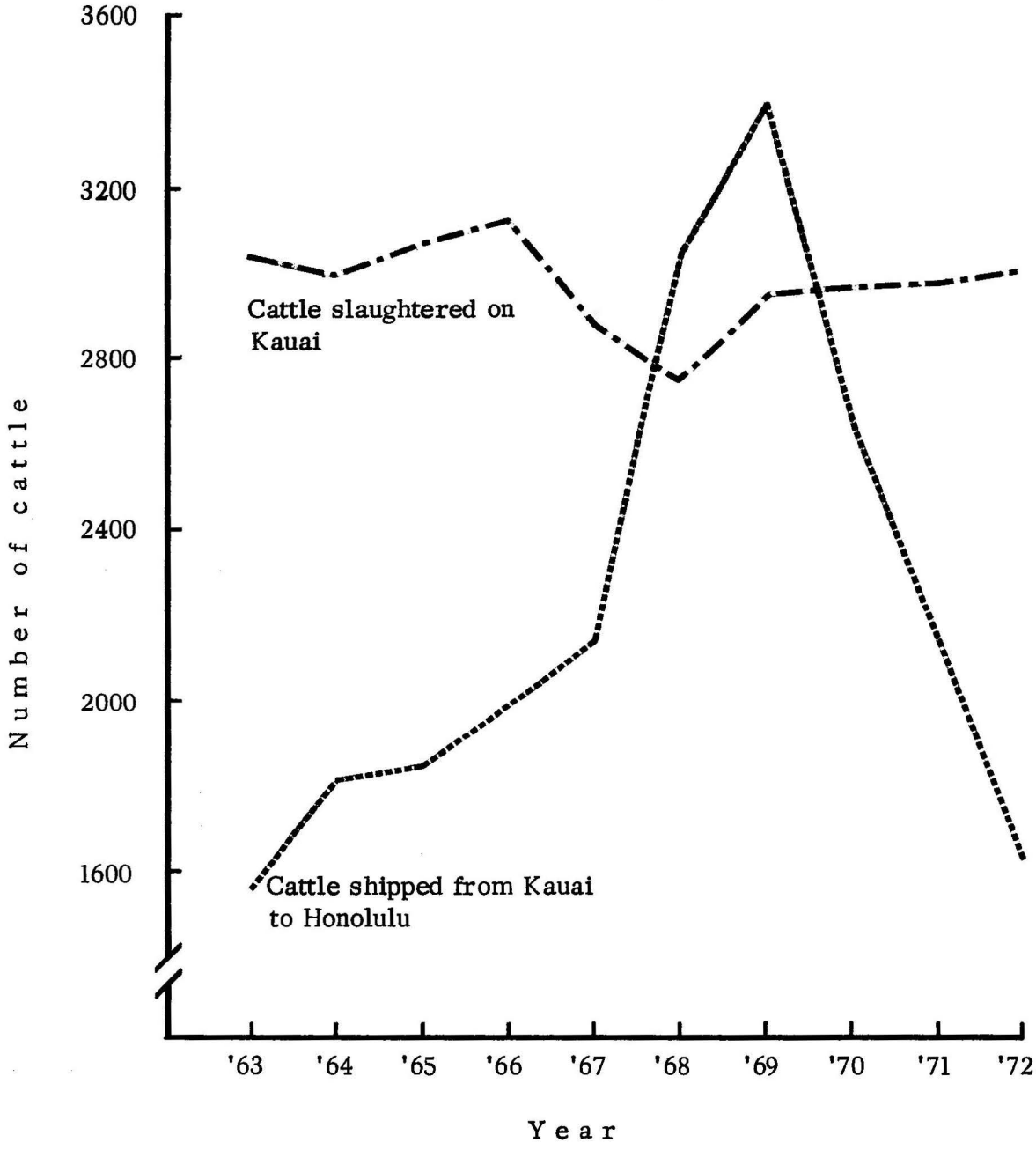
In the decade 1963-72, the same number of cattle originating on Kauai were sold for slaughter in the first as in the last year of the period: 4600 head (see Figure 4). In the same period, however, Kauai showed that it was capable of producing substantially more than this number; for example, in 1969, it produced 6300 head, 37 percent more than in 1972.

Of the two major components of total Kauai slaughter cattle, range and feedlot cattle, the first one, with about 3800 head in an average year, was nearly three times as important as feedlot slaughter cattle, with 1300 head per year (see Figure 4). The number of feedlot slaughter cattle, however, showed a much greater growth potential than did range slaughter cattle. The difference between the best and the poorest years was only 31 percent for range slaughter cattle compared to 250 percent for feedlot cattle. This growth potential in the number of feedlot cattle could be an important factor for the economic feasibility of a new centralized slaughterhouse on Kauai.

Cattle and Hogs Slaughtered on Kauai and Cattle Shipped to Honolulu

Just about the same number of cattle and hogs were slaughtered on Kauai during the year 1972--3000 and 2900 head, respectively, or 58 cattle and 56 hogs per week (see Tables B6 and B11, Appendix B). Similarly, the same number of cattle and hogs--3000 head per year, or 57 head per week--were slaughtered in the average year and weeks, respectively, during the decade 1963-72. Excluding the large slaughter of hogs in 1963, annual slaughter figures were steady during the decade for both types of livestock, with only a 15 percent difference for pigs and a 12 percent difference for cattle between the highest and lowest figures.

Practically all hogs produced on Kauai were also slaughtered there; however, 43 percent of all cattle produced on Kauai were shipped to Honolulu during the 1963-72 period (see Table B11, Appendix B, and Figure 5). In two years, 1968 and 1969, actually more cattle were shipped from Kauai than were slaughtered there (see Figure 5). In both years the number exported exceeded 3000 head. If these cattle, which are shipped live to Honolulu, could be slaughtered on Kauai, the addition to the total slaughter volume on the Island would go a long way in making a new centralized slaughterhouse profitable.



Source: Appendix, Table B6

Figure 5. Number of cattle slaughtered on Kauai or shipped from Kauai to Honolulu, 1963-72.

Beef and Pork Marketings and Consumption

Data on beef and pork marketings and consumption were not available for Kauai because no import statistics were kept for these commodities. However, Kauai consumption was estimated by applying State per capita consumption figures to Kauai. On the basis of these calculations, it is apparent that large amounts of beef and pork were imported to Kauai.

Our estimates show that about 1.2 million pounds of beef per year, or 23,000 pounds per week, were shipped to Kauai, both in 1972 and during the period 1965-72. These imports amounted to about 45 percent of total beef consumption on Kauai during the period. For pork, estimated imports to Kauai were 0.6 million pounds per year, or 11,000 pounds per week, for both the year 1972 alone and for the 1965-72 period. Although less than half as much pork was imported as beef, the proportion of imported pork consumed was higher. Imported pork made up 63 percent of the total pork consumed on Kauai during the 1965-72 period.

As emphasized in Appendix B, the size of these Kauai consumption and inshipment figures are open to question. They may be as much as one-third too high for beef and at least one-fifth too high for pork. But from the point of view of this feasibility study of a new slaughterhouse on Kauai, the exact size of past imports of beef and pork to Kauai is not essential; what is important is that these imports were apparently relatively large compared to the volume of slaughter on Kauai. If the beef and pork formerly imported could be produced and slaughtered on Kauai, and if the cattle formerly exported live could also be slaughtered on Kauai, the potential volume of slaughter cattle for the new slaughterhouse could be greatly increased.

Sheep Slaughter

Sheep are also raised in the County of Kauai; however, only some 100 or so were killed in Kauai slaughterhouses last year, and not much change in the volume of annual kill is expected in the future. Thus, sheep slaughter does not appear to be an important factor affecting the economic feasibility of a new slaughterhouse on Kauai and has been disregarded in this analysis.

CURRENT PRODUCTION, SLAUGHTERING, AND MARKETING CONDITIONS

Cattle and Hog Production

Between 1963 and 1972, the number of people who raised cattle on Kauai, including those with just a few head, diminished greatly, from 260 to 160; however, the number of ranchers with herds of 20 head or more cattle declined a little, from 80 to 75. Dairies with 10 or more milk cows declined from 6 to only 1. People who kept swine decreased from 130 to 50, with those having 10 or more hogs declining relatively less during the decade, from 60 to 35. From the point of view of the feasibility of a new centralized slaughterhouse, this concentration of the livestock industry in fewer hands on Kauai seems of marginal significance. Perhaps a smaller number of ranchers and farmers with a greater economic stake in the welfare of the livestock industry of Kauai will be more interested in a joint and coordinated effort to strengthen it.

Hogs on Kauai are produced in family-sized operations that are predominantly supplementary income enterprises. Swine are raised in confinement and fed either garbage or grain.

Beef cattle ranches on Kauai range in size from a large spread with several thousand head to many small, part-time operations. About 54,000 acres were reported to be in pasture on Kauai in 1972, representing approximately 15 percent of the entire area of the Island. Only 174 acres of grazing land were irrigated in 1972. Pastures are located in widely different rainfall regions, from some areas on the windward side of the Island receiving 100 inches or more per year to some leeward locations receiving only 10 inches. Carrying capacity varies greatly from pasture to pasture. According to the Land Study Bureau of the University of Hawaii, ranches on fertile land receiving adequate rainfall, well distributed throughout the year, may raise 1 animal per acre per year compared with 1 animal on 30 or more acres on dry and poor-grazing land.[1] The best grassland on Kauai may have a yield of 110 or more pounds of beef per acre per year, while only 9 pounds or less may be produced on some of the poor land. About 39 percent of all grazing land carried 1 animal unit per year on 5 to 10 acres, and another 39 percent carried 1 animal unit on 10 to 30 acres.

While many cattle are entirely grass fed on Kauai, some are receiving supplementary grain on pasture to increase the carrying capacity of the ranch and to improve the beef quality of the slaughter animal. Several years ago, a commercial cattle feedlot was in operation in Kauai. A major reason for the establishment of that feedlot was the availability of low-priced byproducts from pineapple canning, which make excellent cattle feed. With the closing of pineapple canning operations, the feedlot was also shut down. The pen feeding facilities have remained unused for several years and are now overgrown with weeds. The 800 Kauai feedlot cattle slaughtered in 1972 and many of those listed for earlier years in Table B5 were shipped as grass-fed feeders from Kauai to Oahu and slaughtered there after a period of pen feeding.

Slaughtering and Marketing

Slaughtering on Kauai is concentrated in fewer slaughter plants today than 20 years ago. In 1954, D. Goodell, in an early study of the possibilities for centralized slaughtering on Kauai, reported that about 35 small slaughtering plants were then in existence on the Island.[2] Today only four beef, two hog, and two poultry slaughterhouses are in operation on Kauai. In addition, three small meat processing plants, which primarily do custom meat cutting, are in existence on the Island.

The 35 slaughterhouses 20 years ago killed between 2800 and 3000 cattle and 3200 hogs per year. That is almost the same slaughter volume as in 1972, when 3000 cattle and 2900 hogs were killed on Kauai (see Tables B6 and B11, Appendix B). A weekly slaughter supply of 57 cattle and 58 hogs is very small indeed for four beef and two hog slaughterhouses. It does not allow for economies of large scale, which could be important to the feasibility of a slaughter plant in a competitive situation.

Kauai slaughter plants have been greatly improved over the past two decades. When Goodell made his study in 1954, the Territorial meat inspection

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[1]Harold L. Baker, Land Classification and Determination of Highest and Best Use of Hawaii's Agricultural Land, University of Hawaii, Land Study Bureau Report No. 10, May 1972.

[2]Dale N. Goodell, Possibilities for Centralized Slaughtering and Processing on Kauai, unpublished report, Kauai Planters Association, Kekaha, Kauai, December 9, 1954.

law was just being put into effect on Kauai. He thought that none of the then existing slaughter plants would pass the requirements of that law. He expected that much remodeling of the plants and revisions of slaughtering practices would be necessary. In contrast, the present slaughter plants are considered to be in good condition for their size. In recent years, slaughterhouse owners have made substantial improvements and invested much money in their plants; all are now approved by the Meat Inspection Branch of the State Department of Agriculture. Federal inspectors also approved them in twelve different inspections over the last several years; these slaughter plants, however, can sell their meat only within the State.

The presently constructed slaughterhouses are protected by a grandfather clause as long as they stay in business and continue to make the improvements required by the inspectors. If these same plants were new plants and had to be approved for the first time, however, it appears doubtful that they would be passed because they have little or no chilling facilities, too much wood on the floors, and other substandard features.

Even though the present beef and hog slaughterhouses are small, their plant capacities are not fully utilized. Their labor forces largely consist of members of the family of the operators, their relatives, and friends, who often are part-time ranchers. Much of the butchering is done in the small hours of the night and on Saturday morning. A large crew, sometimes six or more people, works on the slaughterhouse line and completes the job in a relatively short time. For many workers, slaughtering is a second job, which they do before going to their regular daytime employment. Often little money changes hands in payment for work connected with butchering. Instead, payment is made in cuts of meat, refreshments, services, and so forth. For many slaughter workers, slaughtering is thus part of a way of life and work rather than a formal job.

Locally killed pork is preferred by many Kauai consumers because it is fresh; it is slaughtered early in the morning and, unchilled, available for purchase in retail meat markets the same day. Only one of the four beef slaughterhouses has some chilling facilities; thus, beef too is usually not chilled when it leaves the slaughterhouse. It is also generally not shrouded and not aged.

Most animals are custom slaughtered. Producers and slaughterhouse operators have their own regular marketing outlets, which they have supplied for a long time--either retail markets or final consumers. It is estimated that about 50 percent of the total Kauai slaughter goes to home freezers.

All Kauai slaughtered beef is now sold ungraded; no federal grading is done on the Island at present. Long-time residents of the Island are accustomed to the quality and condition of grass-fed beef on sale in most meat markets, and most people seem mainly concerned about the price. However, an increasing portion of the buying public, particularly the newer residents, are demanding graded, pen-fed beef; stores selling this type of beef report growing sales. Hotels and the better restaurants of Kauai require graded, high-quality beef, which is almost entirely imported.

POTENTIAL FOR EXPANSION OF KAUAI'S CATTLE INDUSTRY

Demand for Kauai Beef

The demand outlook for Kauai beef is good. The trend of beef marketings on Kauai has been generally upward during the period 1966-72 (see Table B9,

Appendix B). According to recent estimates by H. Hogg, no large changes in per capital consumption of beef are expected in the State of Hawaii during the next few years,[3] and this estimate is presumably applicable also to Kauai alone. If we further assume a continuation of the present upward trend in Kauai's population (see Table B8, Appendix B) and per capital income, we can expect a continued strong demand for beef within Kauai. Since, at present, half or more of the State's consumption of beef is imported, in the future Kauai should find no difficulty in selling any of its surplus beef in the State's major market, Honolulu.

This favorable conclusion must, however, be qualified in one important respect. Kauai can expect to sell more beef only if it produces more beef cattle and more of the beef quality for which there is now most demand in the State--high-quality, graded beef.

An estimate of the proportion of federally graded beef sold in the State of Hawaii was made for 1972. It amounted to 58 percent of all beef carcasses sold in that year. The remainder was grass-fed cattle or grassland cattle fed also some supplementary concentrates and beef imported from New Zealand and Australia. This is admittedly a rough estimate of the amount of graded beef sold in the State; it indicates, however, that apparently more than half of the Hawaii market demands pen-fed beef. Kauai did not produce any pen-fed beef in 1972, although some cattle slaughtered on Kauai received concentrates on pasture, and only 17 percent of its beef was exported to feedlots on Oahu. It seems advantageous to Kauai to produce more graded beef, both to substitute for imports of graded beef to the Island and eventually for export to Honolulu and possibly elsewhere.

Supply of Kauai Beef

So far it has been shown that the level of beef slaughter on Kauai has changed little over the past 20 years. Also the number of all slaughter cattle sold that originated on Kauai was the same in 1972 as in 1963 (see Table B5, Appendix B). This historical background gives little reason to be optimistic about the chances for expansion of the cattle industry on Kauai. However, three new factors--higher beef prices, more land for cattle, and newly developing production of feed grain--make possible a change from this trend of stagnation to one of increase in Kauai's cattle output.

A substantial rise in beef prices which began in 1972 can be expected to encourage more intensive cattle production on current pasture land. Experts believe that the present carrying capacity of much of Kauai's ranch land can be substantially increased. This could be done by using more intensive pasture management practices, such as improved grass and legume species, more fertilization, better brush and weed control, additional fencing, and so forth. Investment in more efficiently gaining cattle should also increase output.

Such an intensification of pasture management practices will, however, be undertaken only if ranchers expect that the additional returns from these practices will substantially exceed the additional costs. They have to have confidence that the higher level of beef prices will last and that input costs, such as those for fertilizer, fuel, equipment, and fencing materials, will not increase too much.

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[3]Howard C. Hogg, Honolulu Market Projections for Selected Livestock Products: Beef and Veal, Pork, Eggs, Chicken, and Milk, Departmental Paper No. 15, University of Hawaii, Agr. Exp. Sta., 1974.

With the closing of pineapple canneries and of Kilauea Sugar Plantation, large tracts of land have become available for other uses, of which pasture for beef production is one. A large part of the former Kilauea sugar land has already been fenced and is being used as pasture. Substantial numbers of cattle have been imported from another Island, and further cattle importations are planned to fully stock these new pastures. Whether these and other Kauai lands will stay in cattle pasture or not will depend on the comparative advantage of other crops and the will of the Island community to prevent further encroachment of urban subdivision and golf course developments.

On another portion of the former Kilauea Sugar Plantation, the production of feed grain has begun. About 800 acres of grain were harvested in 1973. Additional areas are being prepared for planting of both sorghum and corn. Since these are fairly new crops for Kauai, their profitability over a number of years has still to be fully demonstrated. Progress in developing suitable grain varieties and appropriate management practices has been encouraging. If grain production in Kilauea should prove to be commercially successful, the locally produced feed grain could become the basis for livestock feedlots on the Island.

At present, all the grain produced in Kilauea is being dried and sold to Honolulu. By selling their output as livestock feed on Kauai in the form of high moisture grain or silage, grain growers could save the costs of drying and shipping the grain off the Island and still make the same net return. Kauai cattle feeders, in turn, would be able to get their grain and roughage at lower prices than could Oahu feedlot operators, who have to import their grain from the Mainland or from other Hawaiian islands.

If the people of Kauai want to develop their cattle industry to the full potential of the Island's expected available resources, they have to develop drylot feeding. Table 1 shows how much the relative importance of pen-fed

Table 1. Percentage of all pen-fed slaughter cattle sold in the State of Hawaii and on Kauai, 1963-72

Year	State of Hawaii	Kauai[1]
1963	27.6	13.0
1964	27.7	12.5
1965	31.5	24.5
1966	40.2	19.6
1967	46.4	34.0
1968	49.3	27.6
1969	47.2	31.7
1970	49.0	37.5
1971	53.0	21.6
1972	58.5	17.4

[1]Actually, many of the pen-fed cattle listed in this column were only raised on Kauai and then shipped to Honolulu for pen feeding and slaughter, particularly during the last years.

SOURCE: Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

cattle has increased in the State of Hawaii during the decade 1963-72. Pen-fed cattle as a percentage of marketings of all Island slaughter cattle increased from 27.6 percent in 1963 to 58.5 percent in 1972--more than half the total marketings that year. Kauai has had no commercial drylot feeding during the last few years. The percentage of Kauai feedlot cattle shown in Table 1 for Kauai during the last few years is based on cattle originating on Kauai and shipped as feeders to Honolulu. Unless drylot feeding is begun on Kauai, an increasing percentage of any additional cattle marketings will have to be shipped to Honolulu feedlots as feeders. Thus the people of Kauai will lose that potential increase in economic activity, employment, and income, which would result from pen feeding and slaughtering of pen-fed cattle on Kauai. Instead, they would have to pay out money to import most of the high-quality, graded beef demanded on the Island.

If pen feeding is reintroduced on Kauai, plans should be made to feed several thousand head at a time because of the comparatively lower cost per head of feeding on a larger scale. Opening of a feedlot operation on Kauai would require changes in ranching practices. At present, most ranchers have cow-long yearling operations--that is, they raise their cattle all the way from calf to slaughter animal. To supply the necessary number of feeders to the feedlot, many ranchers would have to convert to cow-calf (animals sold after weaning) or at least to cow-short yearling (animals sold at about 15 months) operations. Then either they could sell their weaned calves or short yearlings to the pen feeder or they could continue to own the cattle and have the pen feeder feed them on a custom basis.

Attitudes of Kauai Ranchers

At present, many ranchers on Kauai are uncertain about the personal advantages of a feedlot on Kauai, especially if it requires changing their ranching and marketing practices as mentioned above. They fear pen feeding charges would eat up any additional gross returns they might receive by pen fattening their cattle. They look at present Kauai prices for their grass-fattened cattle and see no advantage in pen feeding. If Kauai consumers turn increasingly toward graded beef and away from grass-fattened beef as Honolulu consumers have, however, Kauai prices of grass-fed beef might well become relatively less attractive than prices for pen-fed beef. Kauai ranchers also fear that they would depend too much on the feedlot operator's ability to hold costs down and to turn out a high-quality product without being able to affect his management.

Thus, at present many Kauai cattlemen seem primarily interested in feeding more grain on a supplementary basis in the pasture. The resulting improvement in quality of beef over plain grass-fattened beef would probably strengthen the competitive position of Kauai-produced ungraded beef on the Kauai market, but it is highly doubtful that Kauai consumers, who want Choice graded beef, and particularly Kauai restaurants and hotels, would substitute even this improved local beef for imported federally graded beef. Similarly, it is doubtful that the more fastidious Honolulu market would pay enough for ungraded Kauai beef to make its export to Honolulu profitable.

POTENTIAL FOR EXPANSION OF KAUAI'S HOG INDUSTRY

The potential for expansion of Kauai's hog production does not seem as good as for the Island's beef production. During the past 20 years, pork slaughter on Kauai declined slightly from 3200 head in 1953 to an average of

3000 head for the decade 1963-72. Mainland pork imports to Kauai are estimated to be substantial (see Table B14, Appendix B) but more difficult to replace by Island production than are beef imports by local beef production, especially since chilled beef imported to Kauai sells for as high or higher a price than Kauai-produced beef. Pork, however, except for relatively minor amounts of chilled pork, is imported to Kauai as frozen pork, which sells at substantially lower prices than Kauai-produced fresh pork. The amount of fresh pork that can be sold on Kauai at the higher price, however, is limited. If Kauai hog production should expand much, local pork sold on Kauai would have to be priced more competitively with the imported product than it now does.

Some Kauai hog raisers believe that export of Kauai-produced pork to Honolulu would be economically feasible. In particular, hog growing as a supplementary enterprise to a cattle feedlot might become a profitable enterprise. Generally, prices of pork produced on Kauai are as high or higher than Island pork prices in Honolulu. If Kauai hog producers export much pork to Honolulu, Kauai pork prices could be expected to fall to the level of Honolulu fresh pork prices minus the cost of shipping of pork from Kauai to Honolulu.

The grain now grown on Kauai and exported to Honolulu could be used as hog feed on the Island. The difference between the price of this Island-grown grain and the Mainland-imported grain that Kauai hog raisers now use is expected to reduce the cost of Kauai pork production by only a few cents per pound. Such a small cost reduction alone would not be enough to make Kauai-produced pork fully competitive with imported, frozen, Mainland pork. For these reasons, only a small increase in local pork production is anticipated in this study.

ASSUMED POTENTIAL SLAUGHTER VOLUMES FOR A CENTRALIZED SLAUGHTERHOUSE

The foregoing discussion emphasizes the difficulty if not impossibility of predicting the number of slaughter cattle and hogs that would be delivered to the proposed centralized slaughterhouse. First, we do not know how many cattle and hogs will be produced on Kauai in the near future; second, Kauai livestock producers have three different outlets open to them to market their cattle and hogs: (a) the presently existing slaughterhouses, (b) the new centralized slaughterhouse, and (c) live shipment to Honolulu. In order to arrive at some estimates of the economic feasibility of a new centralized slaughterhouse on Kauai, the following four assumptions were made regarding the volume of supply of slaughter cattle and hogs for the plant.

Slaughter Level 1

A total of 1250 cattle per year, or 24 per week, and no hogs would be slaughtered in the new slaughterhouse. This situation would occur if the new plant attracts only about 40 percent of the cattle slaughtered on Kauai at present, if cattle exports continue at about present levels, and if cattle output does not increase on the Island. All hogs would continue to be slaughtered in the existing slaughterhouses.

Slaughter Level 2

A total of 2500 cattle per year, or 48 head per week, and 1500 hogs per year, or 29 per week, would be slaughtered in the new slaughterhouse. This

would happen if both the operations by the existing Kauai slaughterhouses and the cattle exports to Honolulu remain at present levels and if the Kauai cattle output increases by 50 percent, the increase all being slaughtered in the new slaughterhouse. Alternatively, if both cattle slaughter by the existing plants and cattle exports decline by 50 percent, the remainder of the Kauai cattle would be handled by the new plant, with no increase in Kauai cattle production. Half of all hogs slaughtered on Kauai at present would also be killed in the new slaughterhouse and the remainder in the existing ones.

Slaughter Level 3

A total of 5000 cattle per year, or 96 per week, and 3000 hogs per year, or 58 per week, would be slaughtered in the new slaughterhouse. This supply would be available to the new plant if, for example, cattle production on Kauai does not increase above present levels, but no cattle would be shipped to Honolulu and no other slaughterhouses would operate. Alternatively, if local slaughterhouses kill cattle at present levels, cattle exports would also be at present levels, but cattle production on the Island would double and all the additional cattle would be slaughtered in the new plant. Furthermore, hogs would be marketed at present levels and would all be killed in the new slaughterhouse.

Slaughter Level 4

A total of 10,000 cattle per year, or 192 per week, and 3300 hogs per year, or 63 per week, would be slaughtered in the new slaughterhouse. This would happen if Kauai expands its livestock production to twice as many cattle and 10 percent more hogs than it has at present and if, furthermore, none of these animals are exported or butchered by the existing slaughterhouses. This slaughter situation could occur if, for example, the Federal Inspection Service takes over meat inspection on Kauai and requires such expensive improvements or changes in working conditions that the present slaughterhouses prefer to go out of business. It should be understood that there appears to be no such intention of a take-over by the Federal Inspection Service at this time, even though the Service has in recent years taken over meat inspection in at least 14 Mainland states.

A CENTRALIZED SLAUGHTERHOUSE

Kind and Size

A decision had to be made for purposes of cost and return calculations regarding the type and size of slaughterhouse needed on Kauai. It was decided to think in terms of a slaughterhouse that could not only handle the present production of cattle and hogs on Kauai but also have enough flexibility built into it to be able to process all the cattle and hogs reasonably expected to be slaughtered on Kauai in the near future. Thus, the killing floor has to be large enough to handle 50 head of cattle and 20 hogs per day during an 8-hour day. During a 5-day work week, single shift, such a slaughterhouse could handle 250 cattle and 100 hogs, meaning an annual capacity for 13,000 cattle and 5200 hogs. Since the actual production of slaughter animals on Kauai has averaged about 5000 cattle and 3000 hogs per year during the 1963-72 period, slaughter at the plant at present could proceed at the more leisurely rate of 100 cattle and 58 hogs per week, assuming that all these animals are slaughtered at this plant.

Alternatively, a plant designed to handle no more than the present number of slaughter animals produced on Kauai could be built slightly cheaper. However, if an expansion of such a plant is required in the future, it would be very costly. Since a desire to expand livestock production on Kauai was one of the reasons for this feasibility study, this alternative of using a less costly, smaller plant as the basis of cost and return calculations was discarded.

The following cost and return analyses are based on slaughterhouse operations alone. In calculating the costs of establishing the plant, allowances were made for space and equipment for such processing operations as cutting up the carcasses, deboning, meat grinding, packing of cuts, and so forth. However, no cost and return estimates for further processing of the carcasses were made in this study. It was simply assumed that these processing operations would pay for themselves.

Cost of Building and Equipment

Table 2 summarizes the cost of building an architecturally designed slaughterhouse according to the specifications of the Federal Inspection Service.

Table 2. Costs of building a slaughterhouse assuming three levels of utilization

Item	Slaughter level[1]		
	1-2	3	4
Ground preparation and landscaping	$ 2,000	$ 2,000	$ 2,000
Main building excluding chill and freezer rooms, 3778 sq ft @ $45/sq ft	170,000	170,000	170,000
Chill and freezer rooms, 1500 sq ft @ $80/sq ft	120,000	120,000	120,000
Ancillary structure for compressor, boiler, equipment, and box storage, 460 sq ft @ $20/sq ft	9,200	9,200	9,200
Hide room, 600 sq ft @ $10/sq ft	6,000	6,000	6,000
Total building costs	305,200	305,200	305,200
Holding pens	12,000	12,000	12,000
Total building, holding pen and ground development excluding lagoon and waste system	319,200	319,200	319,200
Equipment excluding generator and boiler	35,000	35,000	35,000
Generator	6,000	6,000	6,000
Boiler installed	9,000	9,000	9,000
Machinery installation including electrical	10,000	10,000	10,000
Total equipment including installation	60,000	60,000	60,000
Total cost of building plant excluding lagoon and waste system	379,200	379,200	379,200
Lagoon and waste system	15,000	25,000	45,000
Total cost of slaughterhouse	394,200	404,200	424,200

[1]See Table 4 or text, pp. 17-18, for assumptions of Slaughter Levels 1 to 4.

The main building includes 5738 square feet of floor space. Of this total, 3778 square feet is used for the killing floor, the cutting and boning room, the manager's and the USDA inspector's offices, and the workers' locker rooms and washroom facilities. The average cost of this portion of the building is estimated at $45 per square foot, with some individual areas costing more and others less than this amount. The holding, chill, and freezer rooms total 1500 square feet and cost $80 per square foot to build. This cooled space should be adequate to age carcasses properly and to store them for as long as 2 weeks if necessary. An ancillary structure of 460 square feet, built at $20 per square foot, will house the compressor and the boiler and provide equipment and box storage. An additional structure of 600 square feet, built at a cost of $10 per square foot, will be used as a hide room. Total costs of the building and auxiliary structures including holding pens are estimated at $319,000.

Equipment including installation costs are estimated to amount to $60,000. Of this total, equipment (partially specified in Appendix C), including installation, costs $45,000, an installed boiler to produce steam costs $9,000, and a generator as a source of emergency power, primarily for the refrigeration system, costs $6,000.

To the above abuilding and equipment costs has to be added the cost of lagoons and a human waste system, which is estimated at three different cost levels, from $15,000 to $45,000, depending on the assumed volume of slaughter. The size of the lagoons is based on the assumption that most of the solid inedible offal and waste is disposed of in a rendering plant or carted off the plant premises as hog feed. The lagoons are designed to handle mainly liquid waste materials and only small amounts of solids.

The overall total estimated cost of building the packing plant ranges from $394,000 to $424,000, depending on the expected slaughter level. The cost of a rendering plant is not included in this estimate.

Annual Cost of Operations

Annual operating costs are given in Table 3. They are divided into two parts--those not dependent and those dependent on the slaughter level. Included in the first group are the land lease rent at $1200; a 4-percent depreciation and maintenance charge of $12,800 on building, pens, and yard; an 8-1/2-percent depreciation charge on equipment of $5100; and the cost of insurance, which is not labor connected, of $1400. The insurance cost includes fire, theft, public, and product liability insurance. These fixed operating costs amount to $20,500 per year.

Among the costs in the second group, those that vary according to output, wages and salaries is the biggest item for all volume assumptions other than Slaughter Level 1 (volume of 1250 cattle and no hogs), under which the slaughtering can be done by a working manager and two workers, all employed for one-third time. One man is expected to be able to slaughter five head and do his share of cleaning up in an 8-hour shift. A 5-day work week and a 50-week work year are assumed. The cost of the working manager is $5000 (one-third time) based on a full-time cost of $15,000. The cost of the workers is calculated at $6.50 per hour, including wage plus labor overhead. Part-time office help is paid $1667.

Under Slaughter Level 2 (volume of 2500 cattle and 1500 hogs), the working manager will work full time, two plant workers will work two-third time, and office help will receive $4000. Under Slaughter Level 3 (volume of 5000 cattle and 3000 hogs), the manager is expected to be fully busy with management, does little or no work on the killing floor, and costs $16,000. Four

plant workers work full time at a cost of $13,000 per worker per year, and one additional worker works two-thirds time. In the case of the above three slaughter levels, it is assumed that all the meat is sold on Kauai. All animals are custom slaughtered, and the owners of the cattle and hogs handle all the marketing.

In the case of Slaughter Level 4, when 10,000 cattle and 3300 hogs are slaughtered, the above assumption of the producers marketing all animals is no longer justified. On the basis of present beef consumption levels, about half the beef has to be marketed off the Island, presumably mainly in Honolulu. It is, therefore, assumed that under Slaughter Level 4 the manager and salesman are involved in the marketing of at least one-half the slaughtered beef. Because of his increased responsibilities, the manager will cost $20,000. The salesman will get $15,000. Nine full-time plant workers will get $117,000, and the office force will receive $10,000, for a total wage and salary bill of $162,000.

The annual maintenance charge on equipment ranges from 5 percent of the original cost, or $3000, for Slaughter Levels 1 and 2, to 7 1/2 percent, or $4500, for Slaughter Level 3, and to 10 percent, or $6000, for Slaughter Level 4. The maintenance charge for the lagoon and waste system, amounting to 10 percent of establishment cost, ranges from $1500 for Levels 1 and 2 to $4500 for Level 4. The builder of the plant must pay an interest charge of 10 percent per annum under present financial conditions. This rate is applied on the full cost of that portion of the investment which is not depreciated, such as costs of the lagoon and ground preparation, and on one-half of the original cost of depreciable items, such as the building, structures, and equipment. This annual interest charge is the largest annual cost item under Slaughter Level 1 and the second largest one after wages and salaries for the other levels, ranging from $20,400 for Slaughter Levels 1 and 2 to $23,400 for Slaughter Level 4.

The other cost items that vary according to slaughter volume are utilities, such as electricity, water, and telephone, and fuel oil, real property tax, office supplies and services, State gross income tax, and miscellaneous charges. These add up to $9700 for Slaughter Level 1 and to $19,600 for Level 4. It is assumed that one phone is sufficient under volume Levels 1 and 2, and two telephones are needed in the case of volume Levels 3 and 4. The number of toll charges is expected to increase with slaughter volume. The real property tax rate is calculated on 70 percent of the value of the real property at the going tax rate for Kauai of $12.73 per $1000 valuation. Under the category "office services" are included such items as legal work, accountant and tax advisory fees, and so on. A State gross income tax rate of 1/2 of 1 percent applies. Under the category "miscellaneous," in addition to minor expenses such as permits and fees, are costs connected with having a federal grader grade that portion of the beef output which is to be sold as graded beef either on Kauai or in Honolulu or elsewhere. Total estimated annual operating costs of the slaughterhouse amount for Slaughter Levels 1 to 4 to $70,000, $92,000, $146,000, and $236,000, respectively.

Returns

Table 4 shows estimated annual gross and net returns and percent return on invested capital for the slaughterhouse under the four different assumed slaughter levels. Gross return per head of cattle is calculated at $44.10. This is based on a slaughter fee of $14.50, a value of $12.00 for the offal, and a return of $17.60 for the hide. The slaughter fee is an average of present fees charged by two Kauai slaughterhouses. In evaluating the offal, account is taken of the fact that a fairly high proportion of Kauai beef livers has to be discarded. In calculating the return per hide, a price of

Table 3. Estimated annual costs of operating a slaughterhouse at four levels of cattle and swine slaughter

Variable	Slaughter level			
	1	2	3	4
Number of cattle slaughtered	1,250	2,500	5,000	10,000
Number of hogs slaughtered	0	1,500	3,000	3,300
Land lease rent @ $100/month	$ 1,200	$ 1,200	$ 1,200	$ 1,200
Building, pen, and yard depreciation and maintenance $319,200 @ 4%	12,768	12,768	12,768	12,768
Equipment depreciation $60,000 @ 8 1/2%	5,100	5,100	5,100	5,100
Insurance[1]	1,400	1,400	1,400	1,400
Subtotal of costs independent of slaughter level	$20,468	$20,468	$ 20,468	$ 20,468
Wages and salaries for:				
Manager	5,000	15,000	16,000	20,000
Plant labor	8,666	17,333	60,667	117,000
Office force	1,667	4,000	6,000	10,000
Salesman	0	0	0	15,000
Total wages and salaries[2]	$15,334	$36,333	$ 82,667	$162,000
Equipment maintenance[3]	3,000	3,000	4,500	6,000
Lagoon and waste system maintenance[4]	1,500	1,500	2,500	4,500
Interest[5]	20,360	20,360	21,360	23,360
Electricity	2,000	2,000	2,500	3,500
Water	600	600	1,000	1,600
Telephone[6]	325	505	1,015	1,315
Fuel oil	600	600	1,200	2,000
Real property tax[7]	2,978	2,978	3,067	3,245
Office supplies and services	1,000	1,100	1,500	2,000
Gross income tax[8]	276	641	1,282	2,403
Miscellaneous	1,900	2,100	3,000	3,500
Total annual operating cost	$70,341	$92,185	$146,059	$235,891

[1]Insurance includes fire, theft, public liability, and product liability.
[2]The following labor force was assumed:
Slaughter Level 1: Working manager 1/3 time at $5000; 2 workers 1/3 time each at $6.50/hour rate including wage plus labor overhead; office help part time.
Slaughter Level 2: Working manager full time at $15,000; 2 workers 2/3 time; office help part time. Slaughter Level 3: Manager at $16,000; 4 workers full time ($13,000) and 1 worker 2/3 time; 1 office worker full time. Slaughter Level 4: Manager at $20,000; salesman at $15,000; 9 workers full time; 2 office workers, 1 full time, 1 part time.
[3]Equipment maintenance: Slaughter Levels 1 and 2--5% of $60,000; Slaughter Level 3--7 1/2%; Slaughter Level 4--10%.
[4]Waste system: 10% per year of original cost.
[5]Interest: 10% on 1/2 value of $377,200 (building and machinery) and 10% on full value of waste system and ground preparation.
[6]Telephone: Slaughter Levels 1 and 2--1 local telephone @ $17.23/month; Slaughter Levels 3 and 4--2 local telephones. Number of toll calls increases with volume of business.
[7]Real property tax rate: $12.73/$1000 valuation at 70% of market value.
[8]State gross income tax: 1/2 of 1 percent of gross income.

Table 4. Estimated annual gross returns, costs, and net returns of the slaughterhouse at four levels of cattle and swine slaughter

Variable	Slaughter level 1	2	3	4
Cattle				
Number of cattle slaughtered	1,250	2,500	5,000	10,000
Gross returns per head of cattle[1]	$ 44.10	$ 44.10	$ 44.10	$ 44.10
Total gross returns from cattle	55,125.00	110,250.00	220,500.00	441,000.00
Hogs				
Number of hogs slaughtered	0	1,500	3,000	3,300
Gross returns per hog[2]	0	$ 12.00	$ 12.00	$ 12.00
Total gross returns from hogs	0	18,000.00	36,000.00	39,600.00
Total gross returns from cattle and hogs	$ 55,125.00	$128,250.00	$256,500.00	$480,600.00
Total annual cost[3]	70,341.00	92,185.00	146,059.00	235,891.00
Net returns (gain or loss)	- 15,216.00	36,065.00	110,441.00	244,709.00
Capital invested[4]	394,200.00	394,200.00	404,200.00	424,200.00
Return on invested capital	-4%	9%	27%	58%

[1]Calculated as follows: Slaughter fee $14.50 per head, hide 80 lb @ $0.22/lb, offal $12.00 per head.
[2]Calculated as follows: Slaughter fee $0.09/lb for market hog, 120 lb dressed; $0.065/lb for sows, 300 lb dressed; and $1.00 per head for offal.
[3]From Table 3. Not included here is the cost of working capital required if, on its own account, the slaughterhouse purchases live animals for slaughter and sale of carcass.
[4]From Table 2.

$0.22 per pound is used, which is lower than present hide prices but much higher than the prices that existed during most of the last decade.

Gross return per hog slaughtered is estimated at $12.00. In arriving at this figure, the present slaughter charge of $0.09 per pound for market hogs was multiplied by the average dressed weight of this type of hog on Kauai of 120 pounds. For sows a slaughter charge of $0.065 per pound was multiplied by a dressed weight of 300 pounds. Offal was valued at $1.00 per hog.

Under Slaughter Level 1 (volume of 1250 cattle per year and no hogs), gross returns to the slaughterhouse would be $55,000 per year. With costs at $70,000, an annual loss of $15,000 can be expected. With an invested capital of $394,000, the plant would have a loss of 4 percent on the invested capital per year.

Under Level 2 (volume of 2500 cattle and 1500 hogs), gross returns would be $128,000 and net returns $36,000 per year. With a capital investment of

$394,000, a 9 percent return on invested capital would result.

With increasing slaughter levels, the slaughterhouse would become highly profitable. With a slaughter of 5000 cattle and 3000 hogs under Slaughter Level 3, gross returns at $256,000 would exceed a quarter million dollars. With net returns at $110,000, and an invested capital of $404,000, a 27 percent annual return on the invested capital can be expected.

In the case of Slaughter Level 4 (volume of 10,000 cattle and 3300 hogs), a gross return of $481,000, close to half a million dollars, is estimated. With an annual net return of $245,000 and a capital investment of $424,000, a high return of 58 percent on invested capital can be expected.

FACTORS FOR CONSIDERATION

Possibility of Margin of Error in Profit Projections

In analyzing the results of this cost and return study, we must point out that they depend on many assumptions. While these assumptions are based on the best available data, they might not turn out to be completely correct when the plant is actually built and put into operation.

For example, we assumed that a plant worker would be able to slaughter 5 cattle per shift, which is a fairly high worker efficiency for a small slaughterhouse like the one under consideration. Suppose we find that the worker efficiency is 50 percent lower than assumed. The resulting increase in labor cost of $16,000 under Slaughter Level 2 (2500 cattle and 1500 hogs slaughtered) would reduce plant net returns to $20,000, or to only a 5-percent return on invested capital per year.

On the other hand, our cost estimates may also be too high. For example, we have assumed that new equipment would be bought. With many small slaughterhouses of about the size of the one planned on Kauai closing on the Mainland, secondhand equipment could possibly be acquired at much lower than estimated prices. Also, the building might be constructed without using an architect, or contract bids for the construction of the building might be lower than estimated. Thus we should allow for some error in these projections in either direction.

Importance of Slaughter Volume

Slaughter volume is clearly a decisive factor affecting the economic feasibility of a centralized slaughterhouse on Kauai. The volume of Slaughter Level 1--1250 head of cattle, or 42 percent of both the average annual beef slaughter during 1972 on Kauai--is clearly insufficient. That slaughter volume results in a loss of $15,000 on gross receipts of $55,000 per year. This means that $0.28 are being lost for every $1.00 in gross returns. Or, to put it differently, the annual net loss is almost exactly equal to the expected wages and salaries that would have to be paid out in a commercial slaughter enterprise of this size. The slaughterhouse operation could break even with this volume only if labor and management were contributed free of charge.

The above annual net loss could almost be wiped out if 1500 hogs, which is half the average annual hog slaughter on Kauai during the 1963-72 decade, could be killed in the slaughterhouse in addition to the 1250 cattle. Gross returns from that level of hog slaughter would be $18,000 per year.

Additional labor charges for butchering these hogs would reduce the net gross income from hog slaughter to about $14,000. This is just about $1000 less than the expected annual loss from slaughtering the 1250 cattle alone.

The slaughterhouse operation would become profitable if 2500 cattle and 1500 hogs could be slaughtered (Slaughter Level 2). A total of 2500 cattle slaughtered amount to 84 percent and 1500 hogs to 50 percent of the average annual slaughter on Kauai during the 1963-72 decade. The expected net return at slaughter level of $36,000, or 9 percent return on invested capital, might be enough to interest a commercial firm in building the slaughterhouse. This would be especially true if such a firm should feel bullish about the chances of further expansion of the slaughter volume of the plant. With doubling of both beef and hog slaughter to 5000 cattle and 3000 hogs per year (Slaughter Level 3), net returns would triple to $110,000 before taxes, enough to pay for the total initial cost of the slaughterhouse in less than 4 years. It must be realized that 5000 head of cattle and 3000 hogs would include roughly the total number of slaughter cattle and hogs marketed on Kauai in an average year during the 1963-72 decade.

Expansion of the annual slaughter at the plant to twice the present Kauai cattle marketings, or 10,000 cattle, and to a 10-percent-greater volume of hogs (Slaughter Level 4) would be a possibility under present market conditions on Kauai and in Honolulu, especially if all available productive resources on Kauai were fully exploited and well managed. If all these cattle and hogs were slaughtered in the centralized slaughterhouse, net returns per year to the plant could rise to almost a quarter million dollars before taxes. Thus, in less than 2 years, net profit would exceed the total original investment in the slaughterhouse.

Importance of "Things Not Economic" to the Success of the Slaughterhouse

With slaughter volume such a key issue to the financial success of a new centralized slaughterhouse, the amount of expected support by the livestock producers of Kauai needs to be established before going ahead with plans for building the plant. Below we quote some observations that D. Goodell made 20 years ago regarding the plan for forming and operating a centralized slaughterhouse on Kauai, which are still relevant.

> "Before putting such a plan in motion many things not economic must be considered. In the first place any new idea is regarded with suspicion. All individuals involved must have it explained to their complete satisfaction before any favorable reaction can be expected. An intensive education campaign must be done prior to forming or even voting to form.
>
> . . .
>
> "Probably the three most serious fears of the small rancher and the hog producer are:
>
> A. Fear that the large interests will dominate the business,
> B. Fear that they will lose their identity and close relationship with individual markets,
> C. Fear of any kind of meat grading.
>
> . . .
>
> "The question of outright purchase of the animals by a company is objected to by some farmers, especially those who are also in the business of wholesaling. It is felt, however, that this would be a distinct

advantage for the average producer whose main business is raising hogs or cattle rather than wholesaling meat.

. . .

"If it were impossible to agree on the question of company or individual ownership of the meat, a standard charge could be worked out whereby those who wanted only custom slaughtering service could get that while others could sell their animals directly to the company....

. . .

"The company can be formed under [State] law either as a cooperative or as a corporation.... In the case of a cooperative, interest on stock is limited to 8 percent (preferably less) with all excess profit declared as a dividend to patrons on the basis of business done.

. . .

"Before any of this is done, however, a concrete indication of producer interest is needed.... A marketing agreement based either on past production history or expected this year's production should be signed with each producer [underlining ours]. A written policy... must be worked out to guarantee fair treatment to all participants...."[4]

Encouragement of Livestock Development

Finally, the arguments for and against a centralized slaughterhouse, which are listed in the introduction, are shortly evaluated. The argument that a centralized slaughterhouse would encourage greater development of the livestock industries of Kauai seems justified. It is doubtful that the present slaughterhouses could handle a much larger slaughter volume unless they change their present methods of operation and make additional plant investments. More animals could be killed in the existing slaughterhouses if the slaughterhouses were used for longer hours; the slaughter crew, however, for whom slaughtering is mostly only a second job, would often be unable or unwilling to work for longer hours. Also, a greater volume of slaughtering would require more cold storage capacity than is currently available in order to avoid sour joint and off-flavored meat. Besides, more stringent inspection requirements might at any time force these slaughterhouse operators to make such large additional investments that they might decide to discontinue operations.

The ample chill rooms of the new slaughter plant would make it now possible to supply the Kauai demand for high-quality grade beef, which has not been feasible so far. This new chill storage would allow aging of beef at the new plant, which the existing plants could not do for lack of cold storage space. The new cooling facilities would also allow the accumulation of enough carcasses so that it would become economically feasible to periodically bring a federal meat grader to Kauai.

This local outlet for high-quality beef would encourage drylot feeding for local consumption on Kauai. To pen feeders on Kauai who want to produce cattle for export, the new plant would allow shipment of their product as chilled beef instead of as live cattle. By slaughtering on Kauai, they could avoid losses from bruising and weight shrinkage, which shipping live cattle

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[4]Goodell, Op. cit.

might entail. The new plant would have enough cold storage to allow accumulation of enough carcasses to fill one big container and thus reduce shipping costs. Pen feeding on Kauai, in turn, would encourage more grain production on the Island.

The new slaughterhouse would bring more uniform handling of carcasses because the same manager would oversee all slaughter operations. Heretofore, slaughtering has been done in different plants by different managers and often by crews of changing composition.

With ample chill rooms, a comparatively large supply of carcasses could now be collected. This would give buyers the opportunity to select more exactly the type and quality of meat desired. Since the slaughterhouse would have fabricating facilities, buyers would have the choice of primal and even retail cuts rather than only carcass sides or quarters as at present.

The additional cold storage facilities of the new plant would provide the consuming public on Kauai with greater meat supplies in case of an emergency, such as an interruption of transportation to the Island. Also, by getting more of their meat from local sources, the people of Kauai could save the additional costs of importing some of their beef.

Cost Issues

Centralization of slaughter would reduce some costs connected with slaughter. Since meat would be originating at only one point, some transportation costs could be reduced by combining shipments. A reduction would be possible in the amount of work and travel involved in collecting byproducts for further processing, such as in a rendering plant. Government inspection personnel could be reduced because inspectors could stay at one plant and inspect more animals during any one slaughter period.

Whether overhead costs other than labor per animal slaughtered would be higher or lower for the new plant than for the existing ones would depend on the slaughter volume of the new plant and on the length of the period under consideration. Since the building and equipment of the new plant would be mostly acquired new, at present high prices, depreciation and interest charges would probably also be high. In contrast, investment in the existing slaughterhouses, established years ago when equipment and building prices were low, may already be fully depreciated, but the existing slaughterhouses may still be serviceable. On the other hand, upkeep costs would be lower for the new plant. Higher utilization per unit time period would also favor the new plant if volume of slaughter were near capacity. On balance, then, building and equipment overhead costs can be expected to be lower for the existing plants than for the new one during the next few years; however, the picture will probably change over the years as more parts of the present plants wear out or become obsolescent and are replaced.

Money labor costs per animal slaughtered would probably be higher for the new plant than for the existing ones. This would depend, however, on the type of labor and the labor organization in the new plant. As described earlier, little money cost for labor is involved in slaughtering in the present plants where much payment for labor is in goods and services. Labor can be expected to be used more efficiently in the new plant, which would have more modern equipment and which would operate on a larger scale, but wages for full-time workers in the new plant would probably have to be at union scales and thus much higher than in the present plants.

So far, it has been assumed in this study that the new slaughterhouse would be operated by a manager and a permanent crew. As an alternative it has

been suggested that the new slaughterhouse could be operated by leasing out the facilities to various producer groups for a day or part of a day. These producer groups would pay for the use of the facilities on a per-head-slaughtered basis. However, this method of operation does not seem practical because it would be difficult to maintain the slaughterhouse in a sanitary and good operating condition and to assign responsibility for damage done to the equipment. An intermediate method of operation, however, whereby one permanent manager would be fully responsible for all slaughterhouse operations, might be feasible. The manager may or may not be assisted by a permanent skeleton crew of one to two men. Additional personnel could be hired on a temporary basis by the day or shift, making possible some part-time employment and thus attracting additional patrons to the plant who themselves or whose friends or relatives would be thus employed. Besides, this method of operation would give the plant greater flexibility in response to day-to-day variation in slaughter volume.

New Jobs

The number of additional jobs created by the operation of the new slaughterhouse should not be overestimated. If we assume Slaughter Level 4 (10,000 cattle and 3300 hogs killed per year), perhaps 10 additional full-time slaughterhouse-connected jobs would be created. The establishment of the new slaughterhouse might indirectly also have some influence in increasing employment in the cattle and hog industries. Labor requirements in modern cattle feedlots are low, however, amounting to only about one man per 1000 head fed. Doubling the production of slaughter cattle and increasing swine slaughter by 10 percent on Kauai would increase employment on ranches and farms, but not in proportion to the increase in livestock numbers because labor needs per animal decline as ranches or hog farms increase in size.

Location

The choice of location of the centralized slaughterhouse on the Island would affect the willingness of some producers to make use of it. A long distance between the ranch or farm and the killing plant would substantially add to the transportation costs and inconvenience for the livestock producer in bringing the animals to slaughter, problems that he might avoid by using an existing slaughterhouse nearby instead. An example of this situation is a centralized slaughter plant in the Northern windward part of the Island and the farm or ranch in the leeward or the Kalaheo section, where some existing slaughterhouses are located.

Such location problems could be partially overcome if the slaughterhouse provides a pickup service. Another factor that would minimize the distance problem between ranch and slaughterhouse is a feedlot operation near the slaughter plant so that the producer of the feeder is not involved in the transportation from feedlot to slaughter plant.

CONCLUSION

A centralized slaughterhouse on Kauai appears to be economically feasible if it can be assured of a sufficient volume of slaughter animals. In order to make a 9 percent return on invested capital, the slaughterhouse would require about 2500 cattle and 1500 hogs, or a comparable mixture of

animals, for slaughter per year. This number of animals would be equal to a little over 80 percent of all the cattle and half of all the hogs slaughtered on Kauai in 1972. At a slaughter level of 1250 cattle and 1500 hogs or less, the slaughterhouse operation would suffer a loss. With increasing slaughter volume the centralized slaughter operation would become highly profitable.

Production of slaughter cattle and hogs on Kauai showed no lasting progress during the decade 1963-72. Now, however, both demand and new supply conditions for beef favor a substantial expansion of the beef cattle industry on the Island. Demand for graded, high-quality beef has increased both on Kauai and in Honolulu. Favorable new supply factors are higher beef prices, additional land for pasture, and a new development of feed grain production.

To translate potential into actual expansion requires willingness to change and to cooperate at all levels of the Kauai cattle industry. A centralized slaughterhouse will be a factor contributing to such an expansion. Before the centralized slaughterhouse can become a reality, however, the livestock producers of Kauai need to sign enough marketing agreements with a proposed slaughterhouse company to assure it of a sufficient slaughter volume and thus to make the slaughterhouse a viable proposition.

It was the purpose of this study to show what factors affect the economic feasibility of a centralized slaughterhouse on Kauai. Different levels of slaughter at such a slaughter plant would require different changes and would have different effects on the several sections of Kauai's livestock industry. We do not advocate any particular stand with regard to the issues relating to a centralized slaughterhouse on Kauai. That is a policy decision that has to be made by the people who constitute Kauai's livestock industry.

APPENDIX A

THE SENATE

SEVENTH LEGISLATURE, 1973 S.R. NO. 68

STATE OF HAWAII

SENATE RESOLUTION

REQUESTING THE DEPARTMENT OF AGRICULTURE TO CONDUCT A FEASIBILITY STUDY ON THE ESTABLISHMENT OF A MEAT PACKING PLANT ON KAUAI.

WHEREAS, in recent years, the two largest agricultural crops on Kauai, sugarcane and pineapple, have been experiencing problems in maintaining their economic feasibility; and

WHEREAS, the closing of the Kilauea Plantation and the shutdown of the Hawaii Fruit Packers' canner has prompted the establishment of a Task Force to study the situation and to recommend alternative agricultural production; and

WHEREAS, according to the agricultural development plan prepared by the Department of Planning and Economic Development, the outlook for the meat industry shows an increased demand for its products which could be filled by the local industry; and

WHEREAS, among the problems facing the expansion of the meat industry is the production costs which include packing, shipping, and other processing costs; and

WHEREAS, the establishment of a meat packing plant on Kauai would accomplish two purposes: it would provide impetus for the development of a cattle industry on Kauai and provide jobs for those who will be out of work as a result of the closing of the cannery and the plantations; and

WHEREAS, the establishment of a meat packing plant on Kauai would be in line with the philosophy expressed by the state government: the need to diversify and develop other areas of agriculture in the State rather than depending solely on sugarcane and pineapple; now, therefore,

BE IT RESOLVED by the Senate of the Seventh Legislature of the State of Hawaii, Regular Session of 1973, that the Department of Agriculture be, and hereby is, requested to conduct a feasibility study on the establishment of a meat packing plant on Kauai; and

BE IT FURTHER RESOLVED that the Department of Agriculture shall submit a report of its findings and recommendations twenty days before the convening of the Regular Session of 1974; and

BE IT FURTHER RESOLVED that a certified copy of this Resolution be transmitted to the Chairman of the Board of Agriculture.

OFFERED BY: /s/ George H. Toyofuku
and 7 others

APPENDIX B

RECENT TRENDS IN CATTLE, BEEF, HOG, AND PORK DEMAND AND SUPPLY

Cattle Numbers, 1961-73

Cattle and calves on Kauai can be separated into two groups--dairy and beef cattle. The number of cows and heifers 2 years old or older kept for milk production, which is the largest sex and age class in the dairy cattle category, declined continuously from an average of 775 head on January 1 during the four-year period 1961-64 to 450 cows on the same day during the 1970-73 period, a decline of 42 percent (Tables B1 and B2). The number of cows and heifers 2 years old and older kept for beef production increased from an average of 7000 head on January 1 of 1961-64 to an average of 7700 head on January 1 of 1965-68, an increase of 10 percent (Figure B1); their number then dropped to an average level of 6600 head on January 1 during the period 1970-73. There was thus a 5.7 percent decline in the average number of beef cows on Kauai between the 1961-64 and 1970-73 periods and a 14 percent decline between the periods 1965-68 and 1970-73 (Tables B1 and B2).

The total beef and dairy cattle population on Kauai on January 1 during the years 1961-64 averaged 18,450 head. It slightly increased to an average of 18,800 head for January 1 of the years 1965-68, or by 2 percent, and declined to an average of 17,100 head for January 1 of the years 1970-73. Thus, the total cattle population on Kauai declined by 7.3 percent between the 1961-64 and 1970-73 periods and by 9.0 percent between the 1965-68 and 1970-73 periods (Figure 1 and Tables B1 and B2).

The number of dairy cows and heifers in the State of Hawaii as a whole during the same period 1961-73 (Tables B3 and B4) declined from an average of 16,000 head on January 1 of the years 1961-64 to an average of 13,000 head on January 1 of the years 1970-73. This amounted to a decline of about 19 percent in comparison, less than half of the 42 percent decline in dairy cows and heifers on Kauai.

The number of beef cows and heifers 2 years old or older in the State increased from an average of 75,000 head on January 1 of the years 1961-64 to an average of 87,000 head on January 1 of the years 1965-68 (Figure B2); this was an increase of 16 percent compared to an increase of only 10 percent for the same type of beef animals on Kauai. The number of these beef cows and heifers further increased in the State from an average of 87,000 head on January 1 of the years 1965-68 to 91,000 head on January 1 of the years 1970-73; this was an increase of 5 percent for the State compared to a 14 percent decrease for the same kind of beef animals on Kauai during the same period. When we compare the changes in numbers of these beef animals in the State and on Kauai in the periods 1961-64 and 1970-73, we find an increase of 22 percent in the State as a whole and a decline of almost 6 percent on Kauai.

The total number of cattle and calves between the 1961-64 and 1965-68 periods increased by 9 percent in the State but by only 2 percent on Kauai. Between the 1965-68 and 1970-73 periods, their number increased by 5 percent in the State but declined by 9 percent on Kauai. Between the 1961-64 and 1970-73 periods, total cattle numbers increased by 15 percent in the State but declined by 7 percent on Kauai (Figures 1 and 3 and Tables B1 to B4).

Table B1. Number of cattle and calves on Kauai, inventory by sex and age classes, January 1, 1961-70[1], per 1000 head

Year	All cattle and calves	Kept for beef production					Kept for milk production		
		Cows and heifers 2 yr and over	Heifers 1-2 yr	Steers 1 yr and over	Bulls 1 yr and over	Calves under 1 yr	Cows and heifers 2 yr and over	Heifers 1-2 yr	Heifer calves under 1 yr
1961	18.8	6.8	2.1	3.0	0.4	5.3	0.8	0.3	0.1
1962	18.2	6.8	2.5	3.0	0.5	4.1	0.8	0.3	0.2
1963	18.0	7.3	1.7	2.9	0.4	4.4	0.8	0.3	0.2
1964	18.8	7.2	1.7	2.2	0.4	6.3	0.7	0.1	0.2
1965	18.5	7.3	2.1	2.8	0.4	5.0	0.6	0.2	0.1
1966	18.7	7.9	1.8	2.5	0.6	5.1	0.6	0.1	0.1
1967	18.4	7.6	1.9	2.2	0.6	5.4	0.5	0.1	0.1
1968	19.6	8.0	2.4	2.8	0.5	5.0	0.5	0.2	0.2
1969	18.7	7.2	2.5	2.9	0.5	4.7	0.5	0.2	0.2
1970	17.4	6.5	2.4	2.8	0.4	4.5	0.5	0.1	0.2

[1]Cattle estimates were changed from sex and age classes to sex and weight classes beginning January 1, 1970.

Table B2. Number of cattle and calves on Kauai, inventory by sex and weight classes, January 1, 1970-73[1], per 1000 head

Year	All cattle and calves	Kept for beef production						Kept for milk production		
		Cows that have calved	Heifers 500 lb and over		Steers 500 lb and over	Bulls 500 lb and over	Steers, heifers, and bulls, under 500 lb	Cows that have calved	Replacement heifers	
			Beef cow replacement	Other					500 lb and over	Under 500 lb
1970	17.4	6.4	0.7	1.7	3.0	0.4	4.4	0.5	0.1	0.2
1971	17.7	6.8	1.3	1.2	3.2	0.4	4.1	0.4	0.2	0.1
1972	16.0	6.1	1.3	1.3	2.2	0.4	3.8	0.5	0.2	0.2
1973	17.3	6.7	1.1	2.0	2.5	0.4	3.9	0.4	0.2	0.1

[1]See footnote 1, Table B1.

SOURCE: Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

Table B3. Number of cattle and calves in State of Hawaii, inventory by sex and age classes, January 1, 1961-70[1], per 1000 head

Year	All cattle and calves	Kept for beef production					Kept for milk production		
		Cows and heifers 2 yr and over	Heifers 1-2 yr	Steers 1 yr and over	Bulls 1 yr and over	Calves under 1 yr	Cows and heifers 2 yr and over	Heifers 1-2 yr	Heifer calves under 1 yr
1961	208	73	22	34	5	52	16	3	3
1962	212	73	24	33	5	54	16	4	3
1963	216	75	25	34	5	54	16	4	3
1964	218	79	26	32	6	52	16	4	3
1965	223	85	25	31	6	53	16	4	3
1966	233	87	25	30	7	60	18	3	3
1967	236	87	25	32	7	63	16	3	3
1968	241	89	27	33	7	62	16	3	4
1969	238	92	24	32	6	61	15	4	4
1970	246	92	25	34	7	65	15	4	4

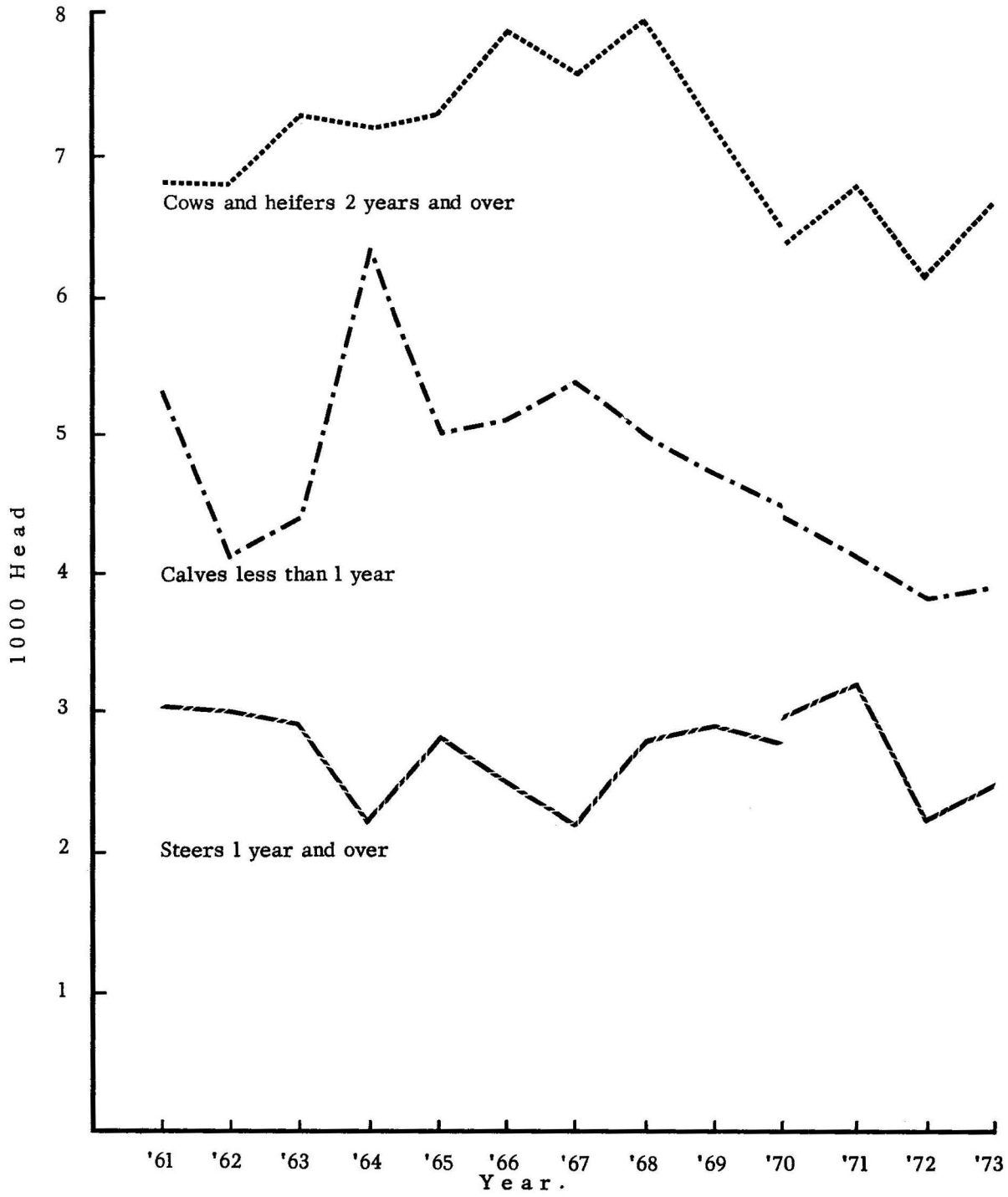
[1]See footnote 1, Table B1.

Table B4. Number of cattle and calves in State of Hawaii, inventory by sex and weight classes, January 1, 1970-73[1], per 1000 head

Year	All cattle and calves	Kept for beef production						Kept for milk production		
		Cows that have calved	Heifers 500 lb and over		Steers 500 lb and over	Bulls 500 lb and over	Steers, heifers, and bulls, under 500 lb	Cows that have calved	Replacement heifers	
			Beef cow replacement	Other					500 lb and over	Under 500 lb
1970	246	90	20	18	35	7	53	13	5	5
1971	249	89	15	23	35	7	59	13	4	4
1972	245	89	15	23	32	7	58	13	5	3
1973	242	90	14	20	30	7	61	13	4	3

[1]See footnote 1, Table B1.

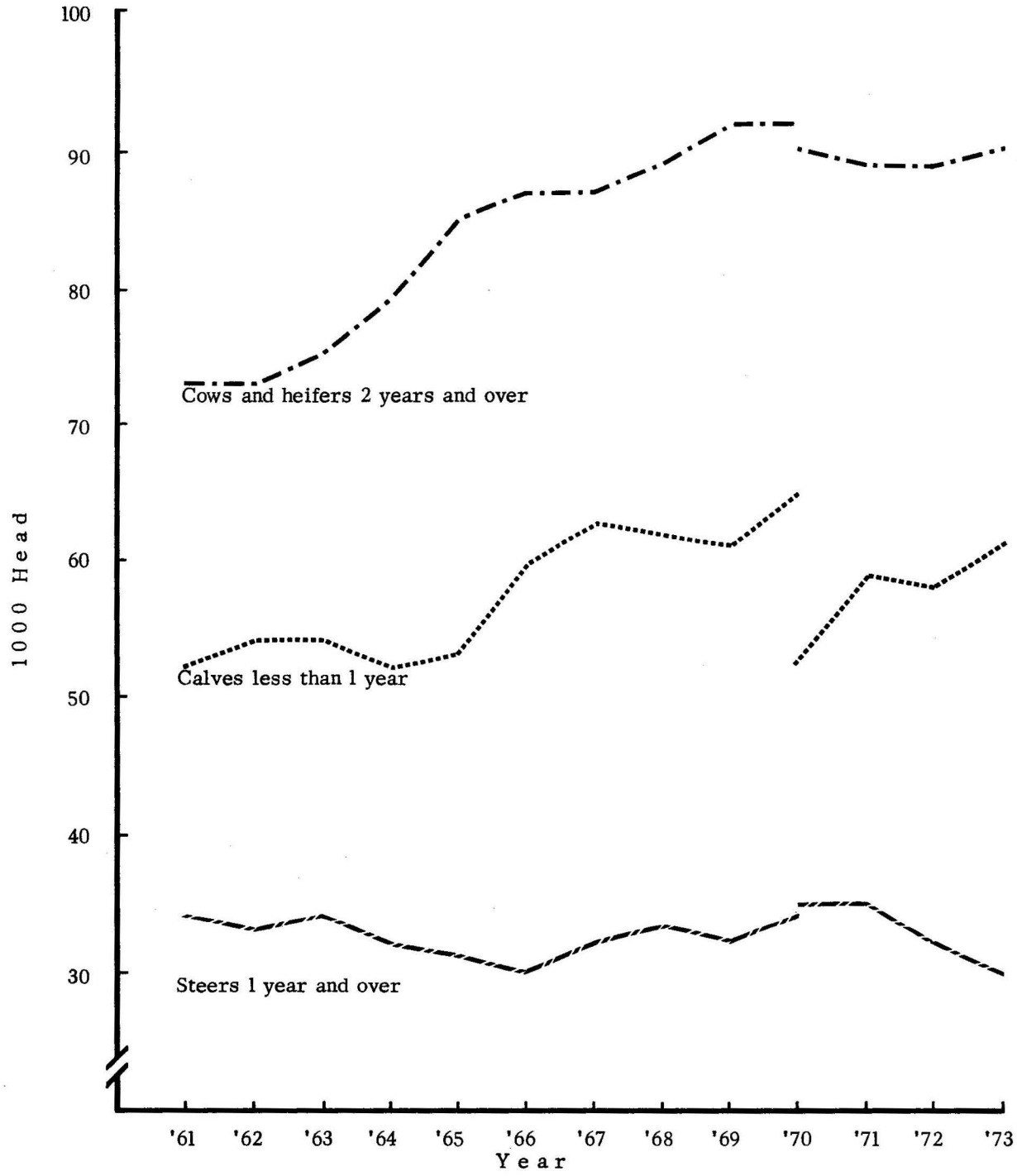
SOURCE: Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture



Note: Cattle estimates were changed from sex and age classes to sex and weight classes beginning January 1, 1970.

Source: Appendix, Tables B1 and B2

Figure B1. Number of cattle and calves kept for beef production on Kauai, 1961-73.



Note: Cattle estimates were changed from sex and age classes to sex and weight classes beginning January 1, 1970.

Source: Appendix, Tables B3 and B4

Figure B2. Number of cattle and calves kept for beef production in State of Hawaii, 1961-73.

Slaughter Cattle Sold, 1963-72

The number of slaughter cattle originating on Kauai sold during the 10-year period 1963-72 increased from 4600 in 1963 to a high of 6300 in 1969, or 37 percent. However, between 1969 and 1972 the number came down again to the 1963 level of 4600 (Figure 4 and Table B5).

The average annual sale of slaughter cattle was 5200 head per year, or 100 head per week, during the years 1963-72 (Table B6). The total number of slaughter cattle from Kauai was broken down into three categories: range, feedlot, and dairy slaughter cattle (Figure 4 and Table B5).

Range slaughter cattle were those animals fattened primarily on grass on ranches, although some may have received supplementary feeding of grain. Range slaughter cattle sold per year fluctuated irregularly from a low of 3200 head in 1967 to a high of 4200 in 1969. Feedlot slaughter cattle were those cattle pen fed primarily on grain and other concentrates to produce a carcass expected to grade Choice or at least Good. Most of these animals were shipped to Honolulu for pen feeding and then slaughtered there. No substantial pen-feeding operations existed on Kauai, except for a few years in the late 1960s. The number of feedlot slaughter cattle from Kauai ranged from a low of 600 head in 1963 and 1964 to a high of 2100 in 1968 and then down again to 800 in 1972. Since the number of dairy animals on Kauai was small, the number of dairy slaughter cattle averaged only about 100 head per year during the period (Figure 4 and Table B5).

Cattle Slaughtered on Kauai and Shipped from Kauai to Honolulu, 1963-72

Cattle slaughtered on Kauai during the period 1963-72 averaged 2964 head per year, or 57 head per week (Figure 5 and Table B6). The annual slaughter rose from 3030 head in 1963 to a high of 3110 in 1966, fell to a low of 2740 in 1968, and then rose back to 3000 in 1972. There was thus little fluctuation in the size of the annual slaughter; the greatest spread, between the 1966 and the 1968 slaughter, amounted to only 12 percent.

The number of cattle shipped annually from Kauai to Honolulu during the period 1963-72 exceeded the Kauai cattle slaughter in 1968 and 1969 (Figure 5 and Table B6). This number rose from 1570 head in 1963 to more than double, 3360, in 1969, and then fell back to 1600 in 1972. Average cattle shipments from Kauai to Honolulu during the 10-year period averaged 2216 head per year, or 43 head per week. Expressed as a percentage of all cattle either slaughtered on Kauai or shipped to Honolulu, cattle exports rose from 34 percent annually in 1963 to a high of 53 percent in 1969 and then dropped back to 35 percent in 1972. During the 10-year period, an average of 43 percent of all slaughter cattle sold on Kauai was shipped to Honolulu.

Beef Marketings and Consumption, 1965-72

Data on total beef marketings and consumption were not available for Kauai because no complete records of beef imports to Kauai were kept. In making estimates of Kauai beef consumption, we assumed that figures on per capita consumption of beef for the entire State of Hawaii were also applicable for Kauai alone. Estimates of total per capita beef consumption for the State were made by dividing the State de facto population, which included visitors present but excluded residents temporarily absent, by the quantity of beef marketed in the State during the 1965-72 period, including both locally produced and imported meat. The State per capita consumption rose from 84.6 pounds, dressed weight, carcass base, in 1965 to 87.3 pounds in 1968 and then

Table B5. Number of slaughter cattle sold which originated on Kauai, 1963-72, in hundreds

Year	Range slaughter cattle[2]	Feedlot slaughter cattle[3]	Dairy slaughter cattle	All slaughter cattle
1963	3900	600	100	4600
1964	4000	600	200	4800
1965	3600	1200	100	4900
1966	4000	1000	100	5100
1967	3200	1700	100	5000
1968	3600	2100	100	5800
1969	4200	2000	100	6300
1970	3400	2100	100	5600
1971	3900	1100	100	5100
1972	3700	800	100	4600
Avg/yr	3750	1320	110	5180

[1]Excludes inter-farm sales; includes custom slaughter for home use on farms where produced.
[2]Animals fattened primarily on grass on ranches but may include some which received supplementary feeding of grain.
[3]Animals fattened on grain or other concentrates which produce a carcass expected to grade good or better.

SOURCE: Statistics of Hawaiian Agriculture 1971 and 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

Table B6. Number of cattle slaughtered on Kauai or shipped from Kauai to Honolulu, 1963-72

Year	Cattle slaughtered on Kauai	Cattle shipped from Kauai to Honolulu	Total cattle slaughtered on Kauai or shipped to Honolulu	Cattle shipped as percentage of total cattle slaughtered and shipped
1963	3030	1570	4600	34.1
1964	2990	1810	4800	37.7
1965	3060	1840	4900	37.6
1966	3110	1990	5100	39.0
1967	2860	2140	5000	42.8
1968	2740	3060	5800	52.8
1969	2940	3360	6300	53.3
1970	2950	2650	5600	47.3
1971	2960	2140	5100	42.0
1972	3000	1600	4600	34.8
Avg/yr	2964	2216	5180	42.8
Avg/wk	57	43	100	

SOURCE: Statistics of Hawaiian Agriculture 1971 and 1972, and unpublished records, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

Table B7. Calculation of per capita consumption of beef and veal in State of Hawaii, 1965-72

Year	Quantity of beef and veal marketed in State[1] (1000 lb)	State de facto population[2] (no.)	State per capita consumption of beef and veal[3] (lb)
1965	60,514	715,428	84.6
1966	60,631	724,581	83.7
1967	61,891	742,639	83.3
1968	66,295	758,839	87.4
1969	67,458	778,848	86.6
1970	67,522	797,308	84.7
1971	67,187	821,812	81.8
1972	68,148	850,255	80.2

[1]Includes only fresh or frozen beef, no canned beef or beef in processed meats.
[2]Includes visitors present and excludes residents temporarily absent.
[3]Calculated by dividing marketings by population.

SOURCE: Beef marketings from Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture; State de facto population from the State of Hawaii Data Book 1973, Hawaii Department of Planning and Economic Development

Table B8. Calculation of total beef and veal marketings, dressed carcass weight, on Kauai, 1965-72

Year	State beef and veal per capita consumption (lb)	De facto population, County of Kauai (no.)	Total beef and veal marketings, County of Kauai (1000 lb)
1965	84.58	29,750	2516
1966	83.68	29,617	2478
1967	83.34	30,180	2515
1968	87.36	31,229	2728
1969	86.61	33,059	2863
1970	84.69	32,553	2757
1971	81.75	33,458	2735
1972	80.15	34,742	2785

SOURCE: State per capita consumption from Table B7; population of the County of Kauai from the records of the Hawaii Department of Planning and Economic Development

gradually declined to 80.2 pounds in 1972 (Table B7). Total annual beef marketings were estimated for Kauai by multiplying the State beef per capita consumption by the de facto population of Kauai (Table B8). Annual marketing estimates for Kauai rose from a low of 2,478,000 pounds of dressed carcass beef in 1966 to a high of 2,863,000 pounds in 1969 and then declined to 2,735,000 pounds in 1971 and 2,785,000 in 1972. Average marketings during the 8-year period 1965-72 were 2,672,000 pounds of dressed beef per year, or 51,400 pounds per week (Table B9).

Kauai beef slaughter declined from 1,490,000 pounds dressed carcass weight in 1966 to 1,358,000 pounds in 1968 and then steadily increased to 1,560,000 pounds in 1972 (Table B9). The average Kauai slaughter during the period 1965-72 was 1,466,200 pounds per year, or 28,200 pounds per week. Kauai beef slaughter expressed as a percentage of estimated total beef marketings on Kauai ranged from a low of 50 percent in 1968 to a high of 60 percent in 1966; it averaged 55 percent for the entire period 1965-72. By subtracting local beef slaughter from estimated total Kauai beef marketings, we arrived at an estimate of annual inshipments of beef and veal into Kauai. These inshipments rose from a low of 988,000 pounds, dressed carcass basis, in 1966 to a high of 1,394,000 pounds in 1969 and then declined to 1,225,000 pounds in 1972. For the period 1965-72, average inshipments were estimated at 1,206,000 pounds per year, or 23,200 pounds per week. Estimated imports of beef as a percentage of total beef marketings on Kauai averaged 45 percent for the period 1965-72 and ranged from a low of 40 percent in 1966 to a high of 50 percent in 1968.

Table B9. Calculation of dressed carcass weight of local slaughter, inshipments, and total marketings of beef and veal on Kauai, 1965-72

Year	Total Kauai marketings of dressed carcass weight (1000 lb)	Kauai slaughter		Inshipment estimates[1]	
		Dressed carcass weight (1000 lb)	Percent of total Kauai marketings (%)	Dressed carcass weight (1000 lb)	Percent of total Kauai marketings (%)
1965	2516	1470	58.4	1046	41.6
1966	2478	1490	60.1	988	39.9
1967	2515	1364	54.2	1151	45.8
1968	2728	1358	49.8	1370	50.2
1969	2863	1469	51.3	1394	48.7
1970	2757	1478	53.6	1279	46.4
1971	2735	1542	56.4	1193	43.6
1972	2785	1560	56.0	1225	44.0
Avg/yr	2672	1466	55.0	1205.8	45.0
Avg/wk	51.4	28.2		23.2	

[1]Estimates calculated by subtracting local slaughter from estimated total Kauai marketings.

SOURCE: Total Kauai marketings from Table B8; Kauai slaughter from files of the Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

The estimates of beef imports to Kauai just calculated seem high for the following reason: the per capita consumption of locally slaughtered beef on Kauai is 11 pounds (32 percent) higher than on Oahu (Table B10). Under the assumption of equal total per capita beef consumption on the two islands, the lower consumption of locally slaughtered beef on Oahu must be made up by imports. Since Oahu has by far the largest share of the State's population and thus of the total State marketings of beef, a less than average amount of inshipments remains available for the Outer Islands, including Kauai. Thus, the previously calculated imports of beef to Kauai appear too high by perhaps as much as one-third.

On the other hand, in late 1973 an estimated 120 beef carcasses were shipped monthly from Honolulu to Kauai. Furthermore, some New Zealand and Australian beef is said to be imported to Kauai. On that basis, our import estimates for beef to Kauai for the year 1972 at least seem justified (Table B10).

Hog Numbers and Slaughter, 1963-72

Hog numbers greatly declined on Kauai during the period 1963-72. While they increased from 2800 head in 1963 to 3400 head in 1965, they were consistently below the 3400 number for the rest of the decade (Figure 2 and Table B11). In 1972, the total hog population was only 2200, or 35 percent below that in 1965. The number of hogs in the State declined by only 19 percent during the same period 1965-72. The number of hogs on Kauai averaged 2500 head during the decade 1963-72.

Table B10. Comparison of per capita marketings of locally slaughtered beef in Counties of Kauai and Honolulu, 1965-72

Year	Kauai beef slaughter (1000 lb)	De facto population, County of Kauai (no.)	Per capita marketings of locally slaughtered beef (lb)	
			Kauai	Oahu
1965	1470	29,750	49.4	29.3
1966	1490	29,617	50.3	34.9
1967	1364	30,180	45.2	44.4
1968	1358	31,229	43.5	39.1
1969	1469	33,059	44.4	33.7
1970	1478	32,553	45.4	32.3
1971	1542	33,458	46.1	34.8
1972	1560	34,742	44.9	30.6
Avg/yr			46.2	34.9

SOURCE: Kauai beef slaughter from records of the Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture; Kauai de facto population from records of the Hawaii Department of Planning and Economic Development

Table B11. Number of hogs on farms and hog slaughter on Kauai, December 1 inventory, 1963-72

Year	Hog population (1000 head)		Hogs sold for slaughter on Kauai	
	Kauai	State	Number[1] (head)	Dressed weight[2] (1000 lb)
1963	2.8	62	3700	312.0
1964	2.9	68	3000	360.3
1965	3.4	72	3000	382.5
1966	3.1	69	2900	347.3
1967	2.2	68	2800	342.0
1968	2.7	64	3100	359.0
1969	1.7	57	3600	405.0
1970	2.0	58	2700	296.3
1971	2.5	62	3000	336.8
1972	2.2	58	2900	384.8
Avg/yr	2.5	64	3000	352.6
Avg/wk			58	6.8

[1]Excludes inter-farm sales; includes custom slaughter for home use, 1966 and following years; includes direct sales on farms to consumers, 1966 and following years.
[2]Excludes custom slaughter for use on farms where purchased.

SOURCE: Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

There was not much of a trend in the number of hogs sold for slaughter on Kauai during the decade 1963-72. An average of 3000 hogs, or 58 head per week, was sold for slaughter per year. The average dressed weight of hogs slaughtered was 353,000 pounds per year, or 6800 pounds per week. The average weight of hogs was light, about 118 pounds per dressed carcass.

Pork Marketings and Consumption, 1963-72

As in the case of beef, no data were available for the total consumption of pork on Kauai. It was assumed again that the per capita consumption of pork on Kauai would be the same as that for the State as a whole. Table B12 shows that the per capita consumption of pork in the State averaged 30 pounds per year for the period 1963-72; it rose from 28.6 pounds in 1963 to a high of 33.5 pounds in 1968 and dropped again to 28.2 pounds in 1972.

Based on this State per capita consumption, total marketings of dressed pork for the 1963-72 decade were estimated for Kauai at an average of 945,000 pounds per year, or 18,000 pounds per week (Tables B13 and B14). Of these total marketings, Kauai slaughtered pork during the period averaged

Table B12. Calculation of per capita consumption of dressed pork in State of Hawaii, 1963-72

Year	Quantity of pork marketed in the State (1000 lb)	State de facto population[1] (no.)	State per capita consumption of pork[2] (lb)
1963	19,892	694,503	28.6
1964	22,033	711,158	31.0
1965	21,691	715,428	30.3
1966	20,505	724,581	28.3
1967	22,931	742,639	30.9
1968	25,398	758,839	33.5
1969	25,220	778,848	32.4
1970	23,106	797,308	29.0
1971	24,026	821,812	29.2
1972	23,941	850,255	28.2
Avg/yr			30.1

[1]Includes visitors present and excludes residents temporarily absent.
[2]Derived by dividing marketings by population.

SOURCE: Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture; State de facto population from the State of Hawaii Data Book 1973, Hawaii Department of Planning and Economic Development

Table B13. Calculation of total dressed pork marketings on Kauai, 1963-72

Year	State pork per capita consumption (lb)	De facto population, County of Kauai (no.)	Total estimated pork marketings, County of Kauai (1000 lb)
1963	28.6	29,587	846
1964	31.0	29,407	912
1965	30.3	29,750	901
1966	28.3	29,617	838
1967	30.9	30,180	933
1968	33.5	31,229	1046
1969	32.4	33,059	1071
1970	29.0	32,553	944
1971	29.2	33,458	977
1972	28.2	34,742	980

SOURCE: State per capita consumption from Table B12; population of the County of Kauai from the records of the Hawaii Department of Planning and Economic Development

Table B14. Dressed weight of local slaughter, inshipments and total marketings of pork on Kauai, 1963-72

Year	Total Kauai marketings (1000 lb)	Kauai slaughter: Slaughtered pork sold (1000 lb)	Kauai slaughter: Percent of total Kauai marketings (%)	Inshipment estimates [1]: Amount (1000 lb)	Inshipment estimates [1]: Percentage of total Kauai marketings (%)
1963	846	312.0	36.9	534.0	63.1
1964	912	360.3	39.5	551.7	60.5
1965	901	382.5	42.5	518.5	57.5
1966	838	347.3	41.4	490.7	58.6
1967	933	342.0	36.7	591.0	63.3
1968	1046	359.3	34.3	686.7	65.7
1969	1071	405.0	37.8	666.0	62.2
1970	944	296.3	31.4	647.7	68.6
1971	977	336.8	34.5	640.2	65.5
1972	980	384.8	39.3	595.2	60.7
Avg/yr	945	352.6	37.4	592.2	62.6
Avg/wk	18	6.8		11.4	

[1]Estimates calculated by subtracting Kauai slaughter from estimated total Kauai marketings.

SOURCE: Kauai marketing from Table B13; Kauai slaughtered pork sold from Statistics of Hawaiian Agriculture 1972, Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture

353,000 pounds per year, or 6800 pounds per week. Inshipments of pork, both frozen and chilled, were estimated at an average of 592,000 per year, or 11,400 pounds per week. Kauai slaughter supplied an average of 37 percent of estimated total pork marketings and inshipments supplied 63 percent. As in the case of beef, the reasonableness of the amount of pork inshipments to Kauai was evaluated by comparing the per capita consumption of locally slaughtered pork in the Counties of Kauai and Honolulu. Over the 10-year period, local pork consumption on Kauai averaged 11.4 pounds per capita, 20 percent more than the 9.5-pound per capita consumption in Honolulu (Table B15). Thus, if we continue the assumption that pork consumption on Kauai was identical to that in the State as a whole, it can be assumed that the pork import estimates to Kauai calculated here are also about 20 percent too high.

Table B15. Comparison of per capita marketings of locally slaughtered pork in Counties of Kauai and Honolulu, 1964-72

Year	Kauai hog slaughter (1000 lb)	De facto population, County of Kauai (no.)	Per capita marketings of locally slaughtered pork (lb)	
			Kauai	Honolulu
1964	360.3	29,407	12.3	11.5
1965	382.5	29,750	12.9	12.0
1966	347.3	29,617	11.7	11.3
1967	342.0	30,180	11.3	10.2
1968	359.3	31,229	11.5	9.5
1969	405.0	33,059	12.3	8.2
1970	296.3	32,553	9.1	7.6
1971	336.8	33,458	10.1	7.4
1972	384.8	34,742	11.1	7.7
Avg/yr	352.6		11.4	9.5

SOURCE: Kauai hog slaughter from Statistics of Hawaiian Agriculture 1972; Honolulu hog slaughter from the files of the Hawaii Crop and Livestock Reporting Service, Hawaii Department of Agriculture; Kauai and Honolulu population from the records of the Hawaii Department of Planning and Economic Development

APPENDIX C

Table C1. Details of some major slaughterhouse equipment at 1974 prices from a mainland supply house

Item	Quantity (no.)	Value
Knocking pen door	1	$ 565
Shackle release system (electro-hydraulic)	1	2,425
Automatic beef lander	1	550
Roller shackles with side finger pickup	4	156
Skinning cradle	1	230
Tripe washer (galvanized body and stainless umbrella)	1	625
Tripe scalder	1	335
Head and tongue inspection table (four-head truck, 4 ft 8 in long)	1	495
Head flushing cabinet	1	560
Viscera inspection table	1	399
Pluck and gullet trimming table	1	289
Head working and trimming table	1	595
Stainless lavatories	2	310
Beef paunch truck	2	1,030
Rumbone saw and carcass splitter	1	980
Saw sterilizer	2	335
Side moving platform	2	2,450
Drum-type electric hoist (2500 lb capacity)	2	3,410
F.M. shallow-pattern-type scale	1	775
Beef trolleys	60	195
Beef spreader and trolley lander	1	105
Tracking	440 ft	1,000
Hog scalder	1	389
Dehairer	1	1,100
Meat block, 35 x 35	1	220
Meat truck (350 lb)	1	143
Hog saw (heavy duty)	1	935
Overhead balancer	3	662
Electric dehider	2	990
Electric pushbutton control hoist for hogs	2	957
High pressure beef wash pump and nozzles	1	1,115
Gambrilling table	1	149
Shackle stops and trolley stops	25	408
Knives, brooms, shrouds, and other misc. equipment		700
Subtotal		25,582
Miscellaneous (including some processing equipment, office furniture, and equipment and transportation costs)		9,418
Total slaughterhouse equipment (excluding generator and boiler)		$35,000

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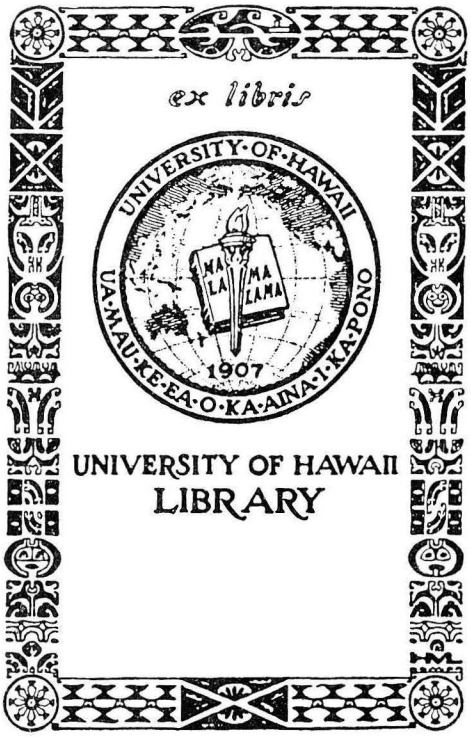
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